The influence of mother tongue on young children's rhythmic behaviour in singing

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Declaration

I, Nozomi Azechi confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

Singing and speaking are closely allied to one other. They are both produced by the same anatomical structures within the human body, although the coordination with the neuroanatomy is differentiated between speech and song. For the young child, existing literature suggests that the border between singing and speaking is opaque, at least in the early years of human life. In order to understand the relationship (if any) between mother tongue in speech and children's singing, a series of empirical studies was undertaken. In the first of these, a specialist rhythmic and linguistic analysis tool (nPVI) was applied to participant three- to five-year-old Japanese and English children's singing of well-known songs. Two subsequent studies explored (2) the rhythmic basis of Japanese and English children's printed song materials and (3) adults' hand clapping of their remembered children's songs from their childhood.

Data analyses revealed that children's singing development appears to be influenced in two dimensions by their mother tongue. One is through a direct influence of the mother tongue's underlying rhythm (a distinctive characteristic of spoken language), and the other is an influence from the rhythm of the song materials that are common in the home culture. From the analysis of young children's actual singing, it was found that the underlying rhythmic bias of the home language was differentially related to the singing behaviour according to age and location (England or Japan).

Another finding was an apparent preference for certain rhythm patterns within each language group. From the analysis of printed song material, different trends in rhythmic structure were found in Japanese and English children's songs. The influence of the home language rhythm appeared to be more direct in English songs, but not in Japanese songs. In particular, the difference between the bias towards an equal-timed rhythm of the Japanese language and the "childlike" nature of the songs brought an

intensive use of the 3:1 dotted rhythm pattern. The common use of dotted rhythm was also linked to the double structure of Japanese language rhythm. This bias was also confirmed by an analysis of example hand clapping of children's songs by participant adults in the third study. Overall, the data suggest that any relationship between mother tongue and singing is culturally located and also developmental in nature.

Acknowledgement

My heartfelt appreciation goes to Prof. G. Welch whose comments and suggestions were of inestimable value for my study. I am also indebt to Prof. Y. Minami and Dr. M. Sadakata whose comments made enormous contribution to my work. I would also like to express my gratitude to my family for their moral support and warm encouragement. Finally, I would like to thank Paul Rogers for all his support that made it possible to complete this study.

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Chapter 1 Introduction: background to the study

1.1 "Japanese-ness": Japanese musical identity

A common starting point for the transmission of culture in human life is the communication that takes place between mother and child. This transmission of sound culture begins even before birth (Parncutt, 2006), starting approximately in the final trimester of pregnancy, when the auditory cortex and related areas of the brain start functioning and processing sound. Language and music, two core pillars of all sound cultures, are major elements within every human groupings, and a focus of human development. Babies and mothers/caregivers often spend much of their time using a special form of talk (infant-directed speech or "Motherese") with evident pleasure (Masataka, 1993). This helps babies to acquire communication skills using expressive sounds. A mother's singing is like talking to the baby, and the baby's reply to the mother often becomes an imitation of the sound expressed by the mother. While the sound-based interaction between mother and baby is made with language and singing, there is likely to be some specific trace of the maternal culture in the way the sounds are shaped. For example, if the mother and baby are Japanese and living in Japan, there is likely to be a strong influence of Japanese language and music on the mother and baby's interaction. This could be considered as the very first stage of cultural transmission in the baby's life. In this chapter, I will focus the initial discussion on Japanese cultural identity in music.

1.1.1 The culturally diverse music environment in Japan

Japan is a culturally globalized country (Robertson, 1992). This globalization process began during the government-led Westernization policy of the Meiji era, when Westernizaion in music was implemented in the field of school education (Ishii, 2007; Chiba, 2007; Dan, 1999) It became the goal of school music to acquire "Western classical music" and this trend is still ongoing; but non-Western music began to return to teaching materials in the 1970's (Ishii, 2007). Popular music also started to be included in school text books in the 1990's, and the number of popular songs appearing has been increasing since then (Ishii, 2207). Furthermore, American influence had a strong effect on Japanese culture after World War II. The influence of jazz, rock and other music can easily be found in popular music in Japan. Therefore, it could said, that Western style music is the basis of much contemporary Japanese music (Dan, 1999). However, in the process of this Westernization, there were still genres and performances, which while played and composed in western style, strongly reflected "Japanese-ness", or Japanese-style musical expression. For example, *Shoka* [唱歌] was school music made at the government's order to help Japanese people in becoming accustomed to Western style music (Okunaka, 2008; Dan, 1999). Enka [演歌] was popular among people in the Showa era, and it contains rich traditional Japanese music elements. Also, in the performance of Western style music, "Japanese-ness" in musical expression appeared via the process of learning a foreign culture's music in the Japanese language. From these examples, it could be said that it is possible to detect a certain 'cultural twist' exerting itself on musical cercumstances in Japan. Therefore, in this section, how the 'cultural twis' had been emarged in Japanese society.

Japan is one of the most culturally diverse places in the world in terms of its music and sound environment. For example, there are diverse indigenous folk traditions, characteristic folk performance styles and traditional instruments still available, alongside music from the West, including an explosion of popular music involving many new technologies. Most Japanese people, especially those who have lived in Japan their whole lives and not had the opportunity to see Japanese culture objectively from the outside, may feel it strange to hear that Japan has a culturally diverse musical environment. Some music teachers and educators, who have been encouraging Japanese children to take more interest in Japanese traditional music, might be happy, since the last revision of the national curriculum in 2002, that there is still evidence of Japanese-ness left in the country's musical culture. However, Japanese-ness in music has been (and still is) talked about as if it is a bad habit to have in the field of music, especially in the field of Western classical music in Japan (Ishii, 2007; Chiba 2007).

On the surface, the Japanese musical environment seems very Westernized. There are different genres of music, and different choices of musical instruments and so on, but some still consider there to be a 'Japanese-ness' about musical expression in the country, whatever style of music is being played (Saitoh, 2000-2001; Nishie, 2006; Denda, 2004; Mori, 2004). This cultural influence can be subtle, even slight, but it has been argued that it is sometimes enough to be noticed in musical expression (Denda, 2004). Some people, especially Western music lovers, may consider it as proof of untrained-ness or amateurishness, as exampled in a recent book (Ishii, 2007: 8) where a Japanese violinist becomes very angry after her performance is described as very Japanese or oriental. She is angry because she has undertaken specialist training in Europe to acquire a Western-style in her musical performance, and has established her career as a concert musician overseas. She had been trying hard to be a Westernized

musician. Therefore, the labeling of "Japanese/oriental performance" is an unbearably severe criticism for her (Ishii, op.cit.). A more tragic story is that of Hisa Kuno (Nakamura, 1995; 1997), who killed herself in 1926 when she recognized that her piano performance was far too different from that of Western musicians. Hisa was one of the first pianists to be trained solely in Japan at its first music conservatory. She became a very successful concert pianist, later becoming a professor at the conservatory teaching piano performance, despite her late start in piano training. She and many people around her believed she could make a big success as a concert pianist, even in Europe, until her first visit there. Her recognition of authentic Western classical music performance broke her. This incident suggests that there was a grave struggle for Japanese people at that time to acquire a totally foreign musical style. Westernization, or in other words, a sloughing off of Japanese-ness, was the prime mission from the beginning of Japan's modernization in the 1870s, which included music education (Ikuma 1997).

On the other hand, this Japanese influence (or Japanese-ness) can be a focused feature in new styles of music. There have been many examples of Japanese-Western fusion music compositions, especially in contemporary re-interpretations of Western classical music using Japanese traditional instruments, such as *shamisen, sanshin* and so on. A famous example is *November Steps* by Takemitsu (1967). More recently, good examples of new music are easily found in 90's J-pop (Japanese pop songs). However, in some cases, there are difficulties in defining this cultural peculiarity and hybridity. Music from so many different genres can make for good fusions and the creation of new sounds, but in some cases, fusion may lead to a confusion of musical styles and expression.

This confusion, and sometimes fusion of music style and expression, is a result of the culturally diverse musical landscape in Japan. Music became a subject in schools

when the Meiji government established its modern education system in 1872 (Ikuma, 1997; Chiba, 2007). Until this time, before which Japan had been a closed country (the Edo era and before), music lessons were undertaken in a strict traditional style. When the Meiji government required the formal teaching of music in schools, they provided a new style of music called "Shoka" [唱歌]. In fact, it took nearly 40 years to publish the first song text book of Shoka. The modern school system was promulgated on the fourth of September 1872. The first Shoka song book "*Jinjo Shogaku Tokuhon Shoka* [尋常小学読本唱歌]" was published in 1910. 40 years were needed for Japanese people in the Meiji-era to study and to produce a Western style music textbook and teaching method for schools. Shoka was created under the supervision of the composer Shuji Isawa. The government's intention was to have a modern style of music as the subject of study. At the time, a modern style was equated with Western music. But Izawa found that Western style music was very different compared to Japanese music, and too difficult to be accepted as a school subject (Okunaka, 2008). Therefore, the government supported the development of a new style of music: "Shoka", which was a fusion of Western and Japanese music. Since then, music education in Japan has continued with its own music style, which can be interpreted as a Japanized Western style of music.

Japan, like many other countries, has steadily come under the influence of media globalization, and therefore, music from all over the world is practically everywhere - including traditional Japanese style genres (though the majority continues to be Western-based music). Unfortunately, unorthodox styles of performance in certain genres can irritate some people, particularly in the performance of Western classical music, where it is perhaps the most obvious to Western perceptions.

In the field of music education especially, this 'confused' style of music expression has been a hurdle to overcome for all Japanese musicians who play Western music. This

is because the tradition of music education in schools and colleges has been focused on Western classical music - which was foreign to Japan before the opening of the country in 1868. Therefore, for music teachers, Japanese-ness in music expression has long been regarded as "incorrect" performance, despite its potential to be an acceptable feature in new style music.

In the field of music education in Japan, personal experience suggests that there seems to be a tendency for accuracy to be required before the performers' own musical expression is permitted. One example is found in Japanese musical competitions, especially for school bands and school choirs, and more serious competitions for young music students wishing to become professionals. An experienced examiner for several piano contests said that contests for young artists usually have their own assignment rules, and the rule is strict in contests for young children's performers. Another cello teacher and experienced contest examiner also said that not making any mistakes is very crucial to win a contest. Examiners must deduct points for every mistake (Private correspondence on the basis of anonymity, July 2012). Another example can be found in the teachers' marking of students' performances. Mistakes are always the easiest thing to be noticed by anyone, while other good points of the performance may be left unnoticed or unmentioned. Inaccuracy can become a focus because of the relative ease in pointing it out, but the players' ability in musical expression and musicality may often be ignored (Yoshinaga, 2003). For most music teachers and critics, Western music has been (and still is) a foreign culture. Therefore, arguments over "correct" or "incorrect" musical performances often dominate critical evaluations (see the comment above from two experienced music contest judges), although this is unlikely to be said publicly among examiners, judges and teachers. Examples are difficult to be found in publications in Japan, even in music magazines

(e.g. "*Band Journal"*, "*Pipers"*). There have been few people brave enough to say publicly that "Japanese musicians' performances are not equivalent to those of Westerners". Such comments are likely to be seen as an admission of 'our' educational failure. One exception was Hiroko Nakamura. She wrote, from her experience as a successful concert pianist in Japan and overseas, about her Japanese-ness in performance. She considered this Japanese-ness as part of herself, and made a decision to be a Japanese pianist, rather than a cosmopolitan one (Nakamura 1992). However, her stance in unusual as Japanese-ness in one's performance has been criticized, if not publicly, then certainly privately between music teachers and students.

In contrast, it seems that this 'correct or incorrect' argument is not particularly important and quite rare in the field of Japanese popular music, especially J-pop. Popular music is heavily commercialized in Japan (The total sales of analog and digital audio recordings reached 607,494 million yen in the 1998, according to the Recording Industry Association of Japan, http://www.riaj.or.jp/data/money/index.html, on the12th of October, 2012). Japanese popular music is classified into many genres. For example, the genres in music CD shops are categorized under such headings as *Enka* (演歌: traditional-style singing written with the Western style score and often played with Western instrumental accompaniment), *folk song* (フォークソング: often anti-war "message folk" songs, popular in the 60's and 70's, and a different genre from traditional folk music), *J-pop* (Japanese pop songs: popular among the younger generation; this term became common in the 1990's), *J-rock*, *J-hip-hop*, *J-reggae*, and so on. Almost all of these are composed in a Western music style, and played mainly on Western instruments, although in some cases it is possible to find sounds from other cultures, or hints of Japanese traditional music. Unfortunately, it is also the case that you may sometimes notice a variable quality of performance in terms of of pitch and the

timing of musical sounds. When compared to the singing of Sumako Matsui (松井須磨子 1886-1919), a very popular singer in Meiji-era, current Japanese musicians' singing pitch has became much better (original recordings of several of her songs , such as "*Katyhusha Song* [カチューシャの唄], http://www.youtube.com/watch?v=TiMpE83f8GM, were found on web, on the 9th of November 2013). It could be said to be "wrong" if you judge it only from a Western musical point of view. For example, even among the bestselling music, it is possible to find many slightly out-of-tune professional singers singing on these million-seller songs. It is especially the case that the rhythm in Japanese popular music is often considered to be relatively uninteresting and sounding off-beat, while some people claim that each note is slightly delayed all the time (Minami and Murao, 2001). This claim is often made about well-known Western songs translated into Japanese. This is considered to be 'non-correct' singing (as commented to the auther by Shinzanoh at JCMPC 2007) and can also be found in educational music materials and on children's CDs.

It may be that only Western classically trained people notice this slight "wrongness" or difference. Speculating on the reasons for the success of these "not quite correct" million seller products, suggests that the subtle "wrongness" has either been accepted (if noticed at all), or it is a performance behaviour accepted by millions of Japanese people as "correct", or possibly regarded as the "cute" appeal of the amateur. It could be also considered that such popular music practice is more closely matched to the flexibility found in Japanese traditional music. Here, a note can be any length, shortened and/or lengthened as much as one wants, but still within a fixed four/two metric structure, and the pitch can be slightly changed to match the singers' physical and emotional condition. For example, "Komoriuta", one of the compulsory songs learned in elementary school, is written in two different modes in textbooks, in

order to to explain the flexibility of traditional songs (see. '*Ongaku no Okurimono 5*', 2011). Although it is in a particular metric structure, the metre need not be the repetition of the same/similar length of notes in a certain tempo. It would seem that Japanese music tends to extremes: either very accurate or very flexible. This flexibility might also be considered as a characteristic of 'Japanese-ness' in music.

The existence of bi-musical or multi-musical performers is another interesting feature of the contemporary music culture. There are very well-trained people who have control over two or more different styles of music (Yoneyama, 2003). All the Japanese court musicians are capable of playing Western instruments. The *Gagaku* orchestra switches into a Western classical music orchestra occasionally. Other traditional Japanese music singers sometimes perform on an opera stage, singing in the Western *bel canto* vocal style. There are musicians who switch their instruments from a Japanese one to a Western version. Such bi-musical people can control their styles of performance, adapting them to suit the occasion. It suggests that people are able to acquire diverse music styles and it is evidence of some success in the Japanese music education system, whether intended or not. However, it must be noted that personal habits in musical expression and musical style are different. Some musicians might show a sort of similar way of musical expression in different styles of music performance, akin to a person's intonation or dialect. Showing a slight Japanese-ness in any style of music performance is based on personal preference. It could be called "musical dialect". Arguably, this "dialect" could have formed before the person acquired any style of music, when they were a young child, and still within the developmental process of acquiring their own culture. It may be that one of the main things shaping this "musical dialect" is the influence of the musician's mother tongue.

1.1.2 The survival of musical "Japanese-ness" during over one hundred years of Western-based music education in schools

Japan's music education has been focused on Western classical music since the very beginning of the modernization of the education system in 1868. This was because of the government's Westernization policy around that time. Western-focused music education was maintained until finally, quite recently, modern day governments started a slight adjustment, recognizing the importance of Japanese culture and "Japanese-ness."

Seeking Japanese-ness has become a trend in Japan currently. It is called [和ブーム: the Japan boom] in the media (Watanabe, 2009). Things considered "Japanese" are becoming popular again, and this applies not only to music, but things in general, such as traditional buildings, kimonos, kabuki plays, rakugo performances, ancient martial arts and the Japanese language. It was said that this movement was imported from overseas. Japanese foods, such as sushi, teppanyaki, and miso-soup became fashionable abroad, and Zen style interiors as well. This led Japanese people to recognize Japanese-ness as something valuable, and something to be proud of. The younger generation, especially, appears to find it 'cool', maybe because they are relatively removed from Japanese traditional culture, and their lives are overly Westernized, so it looks totally 'new' to their eyes. There have been bestselling books which warn about losing the sense of Japanese-ness and searching for Japanese-ness in society (Abe, 2006; Fujiwara, 2005). And now, as well as this trend for nostalgia (or maybe because of this trend), Japanese politicians have decided to make a big change in education.

The Japanese Government decided in 2006 to carry out a reform of the Fundamental Law of Education. The bill to amend this law was passed on 15th

December 2006. The word ‘patriotism’ was one of the focal points of the new Fundamental Law of Education, and later the word was changed to “郷土を愛する心 (the heart to love one’s homeland)”. It is expected that the stress on Japanese-ness, on one’s own culture and Japanese tradition, will also be more evidenced in music education, for the purposes of promoting patriotism, such as has happened in other times and places. For example, patriotism became one aspect of student assessment in over 50 elementary schools in 2003. Teachers had to educate the students in patriotism and to evaluate them on this basis. It caused a big debate within society. The former Prime Minister Koizumi stated that it was not possible to evaluate and mark students’ feelings and that it was totally unnecessary (Mainichi web news, 2006, www.mainichi-msn.co.jp/shakai/edu/news/20060526k0000m040165000c.html).

This phenomenon has been reflected in music education as well. In the previous reform of the National Curriculum Standards in 1998 (Ministry of Education, Culture, Sports, Science and Technology, 1998), Japanese traditional music was given a slightly more important role than just an appearance as one of the listening materials in the world music section. It became a compulsory part of the music curriculum in junior high schools.

This change occurred after over one hundred years of ‘modern education’ in schools. However, people had been thinking in opposing terms before this new policy. For example, piano lessons had been one of the most popular after-school education experiences for children in the 70s and 80s. According to a survey in 1999 by The Statistics Bureau Japan, households of more than two residents’ music related property holding rates were: piano 25.2%, electric keyboard 21.9％, CD/MD/radio/cassette player 77.9％, and audio stereo sets 49.4% (The Statistic Bureau Japan, 1999).

In education in schools, in general, we can find very little traditional Japanese music compared to that of Western style. Music education in schools in Japan has focused on 18-19th Century Western classical music throughout its modern existence (Minegishi, 2005). At the very beginning of this period (the 1880s) in the newly formed school system, traditional Japanese music was considered for adults only, and not suitable for children's development (Chiba, 2007). The Meiji Government placed a large emphasis on the promotion of Westernization, which in that era meant establishing a modern education system equivalent to that found in the West. Later on, people noticed an imbalance in Japanese music education – this being a lack of music from their own native culture. Consequently, in the 1980s, the Japanese Government gradually began to change the national curriculum. In the current national curriculum (established in 1998), Japanese traditional music was included as listening material for elementary, junior high and high schools. Also the learning of at least one traditional instrument is now meant to be compulsory in junior high school. Although this was a significant change, traditional music is still nevertheless treated as an example of ethnic music, and Western classical music is still the basis of music education in Japan. For example, there appears to be no place for *warabeuta* (Japanese children's play songs) in formal music education. There have been revival movements of *warabeuta* in schools at certain times (Akiyama, 2008; Kojima, 2009), but once they were taught formally in the classroom along with other educational music materials, they became something else and these *warabeuta* lost their original character. However, the original *warabeuta* still survived among young children in their play songs outside the curriculum until the 1990's (Iwai, 1998).

In studies of children's music activities outside schools in the 1960s and 1970s (Koizumi, 1984; Kojima, 1999), the same theme is always repeated by teachers: "You

would not find any *warabeuta*. Our children have been very Westernized", implying that children were being given a modern education. During each reported experience of academic fieldwork, however, researchers were always relieved to find that there were still enough *warabeuta* existing and that the style had kept evolving into new varieties among children. This finding was repeated in Iwai's fieldwork in 2000 (Iwai, 2001). He could still see Japanese-ness in those children's songs, even though teachers no longer taught that sort of music in schools. It may be because it is not taught formally and does not exist as "music materials" in textbooks as such that it remains and evolves in some natural way. It is unclear how children gain a sense of Japanese music rhythm without any formal education in it.

I had an opportunity to hear a group of young children singing naturally in a traditional *warabeuta* rhythm during my preliminary fieldwork. It happened when I visited a kindergarten in Japan in September 2003 to undertake a pilot study. Before I went into the playground, I had an opportunity to talk with a few nursery school teachers. When I asked them about the children's favourite songs, especially their favourite *warabeuta* (Japanese children's play songs), they said that children nowadays did not know *warabeuta* unless they had been especially taught them (Fieldwork notes, September 2003, Sakurai kindergarten). Teachers said that they preferred to use "new songs" rather than *warabeuta*. For example, NHK (Nippon Housou Kyoukai: the TV media channel) music TV programme for children, "minna no uta" (literally meaning "everyone's songs"), which introduces new songs for children every month, is quite popular among teachers, parents and (therefore) children. Moreover, the teachers said that it is rare to hear children in the school singing *warabeuta,* and that they prefer J-pop. The music media aimed at young children is very large in Japan. A huge amount of CDs, music books, videos and DVDs are released every year aimed at children

(Ongakunotomosha, 2005), and media songs are usually written in a Western musical style and performed on Western Instruments. Nevertheless, the first time I went into the playground, the children chanted at me in excitement at seeing a new adult stranger. The chanting was a repetition of the word "jiji-baba", meaning "an old woman who looks like an old man", which became my nickname for a while afterwards. The chanting was in a very basic *warabeuta* style, with a two-tone melody and in two-beat metre. This chanting occurred very naturally and began spontaneously from one child, then quickly spread amongst a group of children. The melody and rhythm kept changing slightly and were arranged with small variations. It was unclear how the children could have gained the skill of improvising in this particular style without the learning of *warabeuta.* It would seem perhaps that word playing naturally becomes singing.

Coincidentally, the very same day I had heard a story from a retired professor who had taught for thirty years on a nursery teachers' training course at a junior-high college. She reported that, in her experience, 19- or 20-year-old college students in this nursery school training course also preferred to compose songs in a *warabeuta* music style. The students had learned the basics of Western classical music in an intensive one-year course and gained the required musical skills necessary to be nursery teachers, especially in singing and piano performance for the purpose of children's singing accompaniment. However, when the students undertook composition tasks, most of them did not compose songs in a Western musical style. Most of the compositions were in *warabeuta*-style. The melodies used the traditional Japanese music scales, and simple rhythmic patterns were used to fit the Japanese lyrics more naturally.

Similarly, narrowness in the variety of rhythmic schemes used in composition tasks has also been reported in a study of elementary school children's composition skill development (Umemoto and Iwabuki, 1990). The rhythmic influence of the Japanese

mother tongue was believed to be an important factor in the limited variation of rhythms used. Fifty-eight 5- to 10-year-old elementary school students were given the same simple and short lyrics for a composition task. Except for six participants, all of the remaining fifty-two participants were found to have created a melody with exactly the same rhythm. The rhythms of the melodies fell within Koizumi's basic rhythm patterns for *warabeuta* (Koizumi, 1984). Umemoto and Iwabuki (1990) considered that the common rhythmic invention occurred because the lyric itself had well-established prosodic features. They believed that the influence of Japanese linguistic rhythm could be considered as the main contributory factor. As Umemoto pointed out, for the Japanese, uttering words on beats is regarded as singing, even if it is not in a melody, and without any tune. This suggests that maybe singing is a little closer to speaking for Japanese than it is for Westerners. This close relationship between singing and speaking, therefore, in music and language could be one of the reasons why Japanese-ness could be evidenced in playground songs and compositions even in today's Japanese children, without any obvious formal education in Japan.

1.2 Comparative studies between cultures

1.2.1 Japanese vs. Western musical expressions

Various studies have been carried out on 'cultural differences in music perception and production'. These studies have suggested that the way in which people perceive musical rhythm is different between cultures (Drake & Ben El Heni, 2003; Iversen, Patel and Ohgushi, 2004; Hannon, 2005), and that the way people produce rhythm is

different between cultures (Minami & Murao, 2001, Ohgushi, 2002, Sadakata, Ohgushi, & Desain, 2004). Cultural differences have been reported in both perception and production. The influence of the mother tongue was highlighted as a main factor in such studies by Patel et. al. (2000) and Sadakata et. al. (2004). Ohgushi (2002) also demonstrated that there are differences in musical performance and expression between Japanese and Western cultures. From these studies, it seems that the rhythm of the mother language has an impact on the way people communicate with rhythm.

The results of Ohgushi's study (2002) suggest that Japanese professional pianists play certain rhythmic patterns more accurately than Western professional pianists. In contrast, Sadakata et. al.'s (2004) study suggested that there was no difference between Japanese and Dutch professional percussion players in terms of producing several types of rhythmic pattern, unless the pattern became very complicated. The participants of these studies were all professional musicians. They had been trained to play correctly and in Western classical music style; however, the tasks were different in Sadakata et. al.'s study, as their task was to reproduce the correct rhythm whilst Ohgushi's analysis was carried out on CD recordings. The participants in Sadakata's study did not demonstrate a difference between the two cultural groups unless the task became complicated. In other words, these trained musicians showed their Japanese-ness and Dutch-ness only when they began to lose control in their trained style of performance. In Ogushi's study, musicians' expression in their performance was analysed on the well-known "difficult" rhythmic pattern for only one of the cultural groups. (According to Koizumi, 1987, the dotted rhythm (♩. ♪) did not exist in *warabeuta*, therefore was not evidenced in traditional Japanese music). The results demonstrated a higher accuracy in the Japanese group. It suggests, therefore, that Japanese performers have been trained to play the "difficult" rhythm pattern correctly,

but had somehow lost the freedom to play it with some musical expression, while Westerners performance were more variable (though there was a certain tendency among their performances). In playing the particular rhythmic pattern, Japanese professional musicians played accurately while Westerners played freely. For music learners and for young students, especially Japanese, playing accurately is still difficult for some certain music patterns, such as dotted rhythms (Ohgushi, 2002). In that case, there still remains a "Japanese-ness" in their musical behaviour as it appears in their performances.

All the results demonstrating such cultural differences in musical performance have been based on adult participants, rather than children. Therefore, these cultural differences emerged only on difficult-to-manage tasks in performances (at the limits of the performers' skill), or in not fully-trained peoples' performance (in the case of Japan). The developmental process of this type of different cultural expression/perception is still unknown. It is said that new-born babies have a broad receptivity to any cultural formula (Eimas et. al., 1971). As they grow up, the acquisition converges into one culture, to the baby's maternal culture. When and how this cultural formula impacts during young children's development is still not clearly known. There have been many studies on children's (and adults') language acquisition (Pinker, 1994; Yang, 2006), and on bi-lingualism, but not on bi-musical people. The relationship between enculturation and young children's musical development is not clear, nor whether it is related to their language acquisition processes. It may be that the rhythm of music and of their mother tongue are related to each other during development. Nor do we know if language acquisition and enculturation into a particular music culture happens at the same time and during the same developmental stage.

1.2.2. Japanese-like performance among music learners

My research hypothesis (see section 1. 4. 1.) came from my experience as a music teacher, learner, and player. In instrumental lessons (e.g. piano and cello lessons), some teachers told me to 'play as you sing. just naturally, sing! Then, it will become music.' This riddling form of instruction from music teachers has often been evidenced when students can re-produce musical phrases accurately, but without enough expression. Another popular comment of this sort is 'You are so Japanese!', which is always said with grief. This phrase is often used when we (students) have done something wrong, but something which is not clearly written on the music score, and in most cases, it is often about rhythm. To play a 'correct' performance is not good enough. Japanese students in Japan learn to create a metric accent, which is not written on the music score, and which does not come naturally to Japanese. We learn music performance skills from the written score, plus an extra knowledge of Western music, but it seems that something may still be missing from our musical performance; there is a slight wrongness. Those who often notice and claim the slight wrongness have been teachers, trainers and conductors who have studied music abroad for a certain period of time. This observation is based on my experience of learning from them as a music student. The composers and musicians may speak German or another Western language; they have learnt the rhythm of the language and the culture, and they are very different to the average Japanese person. These teachers and conductors say, therefore, that we should endeavour to learn about the culture, language and history of the music that we wish to play, in order to be more authentic. This attitude among music teachers led me to the underlying question of this thesis; "So… what is this Japanese-ness in musical performance?"

It is often heard among musicians and audiences that Japanese people are very exposed to Western music, but when we play it, something is still different. Trained Japanese musicians play with accurate pitch and accurate rhythm, but still something is different to the Westerner's performance. This difference, or sometimes as it is claimed, 'wrongness', might be caused by our original Japanese musical sense: Japanese-ness. Throughout my experience, there have always been these questions: "What is Japanese-ness?" and "What is a Japanese rhythmic sense?" In my experiences this Japanese-ness is often pointed out in rhythmic aspects in rehearsals and music classes. This may be highlighted by comparing the pitch problem: there are many musically trained Japanese who have absolute pitch (Saisho, 1998). This tendency suggests that pitch is less likely to be variable in performance. It was necessary to acquire this first, but the rhythmic aspect was left behind.

I have another experience which made me think of Japanese-ness in rhythm. I felt a subtle but certain difference of "rhythmic sense" [リズム感] in both music and language between Japanese monolingual and bi- or tri-lingual children, when I was teaching music in an elementary school in Japan. An example of rhythmic sense was as follows: in a particular session, I was teaching new rhythmic patterns to seven and eight-year-olds using the prescribed Ministry textbook, which was based on the national curriculum. In the session, several familiar nouns, most of them being the name of foods, were used to explain the new rhythm patterns to be learnt. These explanations were quite easy and helpful for Japanese monolingual children to understand the new rhythmic patterns, but they were not easy for the bi-/tri-lingual children. It seemed that those students who spoke the Japanese language as a second or third language did not have the same "rhythmic sense" of the Japanese language as native speakers, and that those students' speaking and reading skills were inadequate to fully comprehend the

explanation. Consequently, I wondered if reading skill in Japanese was somehow related to a rhythmic sense, because one Japanese letter is nearly equivalent to one mora (a mora being a single pronounceable unit). So then, perhaps acquisition levels of language and musical rhythm might somehow be related. The bi-/tri-lingual children in the class were not poor in other musical activities such as singing, playing instruments and dancing. Their difficulty in learning the new rhythmic patterns seemed to be simply because the instruction was using the rhythm of Japanese words. Therefore, the level of acquisition in Japanese language rhythm seemed to influence the children's understanding of the new rhythm patterns. It implies that, learning music in the Japanese language leads to an acquisition of Japanese-ness in music. "Learning music in the Japanese language" brings an element of Japanese language rhythm to the musician's musical rhythm.

1.3. Degrees of enculturation and proficiency

Choosing one form of measurement for comparing cultures is not an easy task. The object of comparison can elicit totally different ideas in two distinct cultures, even if it looks to be similar and is sometimes named the same way (e.g. the word *utau* in Japanese has a broader meaning; sing, descant, recite, chant, intone, warble, express, state, extol, compared to the word "sing" in English).

Understanding of the music term *fermata* is also different for Japanese and Westerners (Ishii, 2007). Fermata has been defined as "a pause of unspecified length on a note or rest" in *The Concise Oxford English Dictionary*, Oxford University Press 2002), while it is regarded in Japan as 延音記号 or 延長記号 [being a symbol for

lengthening a music note or a rest]. Ishii pointed out that when a singer is singing a music note with fermata, a Western audience may perhaps be anticipating the music to stop, while a Japanese audience may be feeling that the singer is uplifting the emotion and enjoying the music (Ishii, 2007, p17). He believes that this is because of the nature of Japanese traditional music. The length of music notes can be very flexible in relation to the singer's feeling, and/or physical condition.

Western style music in Japanese society today could be a slightly different style of music than the Western style music played in Western countries. J-pop is another example. It is played on Western instruments (guitar, bass-guitar, piano and drums) within a Western music style (a music scale in the Western tonal system, metric accent, and chord), but it has been transformed to some degree into a Japanese style, and has some Japanese-ness. In other words, the Japanese performance of Western style music is quite similar, but still different to the Western version. With the same instruments (Western ones) in the same music system (Western), the only difference that can be heard is in the musical expression. Therefore, by analyzing the different musical expression by culture, it is possible to compare the differences between cultures, such as in terms of their "sense of musical rhythm".

Two points that we have to think carefully about, and make clarifications for in our comparative study between cultures, are the definitions of the Degree of Enculturation [文化度], and Degree of Proficiency [熟達度]. A definition of these terms is below:

- **the degree of enculturation**: how much a person's cultural aspect is formed in a certain style. Every child has an unlimited possibility to gain any cultural background when they are young. The surrounding environment will provide the

cultural identity that the child will acquire. In a way, this process of enculturation ties or restricts a child's behaviours into one specific culture.

This degree of enculturation can be demonstrated by a simple line with each end indicating a different culture. Moving along the line, one can see how a person's behaviour shifts from one culture to the other (e.g. Figure 1. 1). One end of the line represents the mother culture and the other the learning culture. For example, mother tongue could be at one end, and an acquired second language at the other.

- **the degree of proficiency**: proficiency in a certain style of music and a certain language, for example, language acquisition and musical ability in each style/genre of music. Different styles and genres of music must be scaled differently (i.e. the proficiency within Western classical music style of performance, not crossing styles).

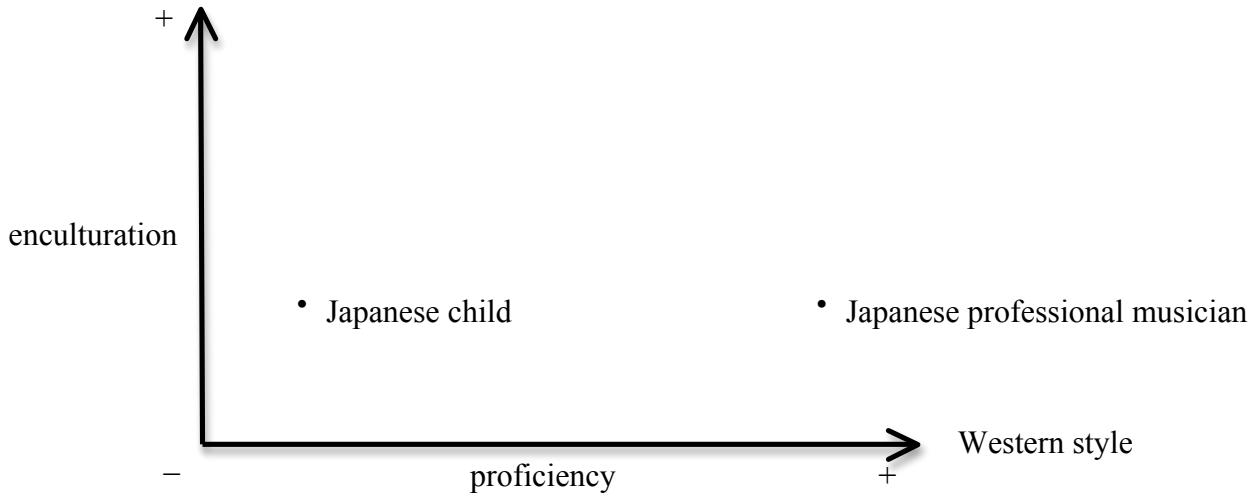


Figure 1.1 An example of the degrees of enculturation and proficiency in Western style music

Degrees of proficiency and of enculturation are often mixed up in studies in Japan, especially in the field of music development. It is because "music education" usually means learning Western (foreign) music for Japanese people. This is because the learning process is an acquisition of another culture, akin to Japanese musicians' process of Westernization. Personal experience suggests that a "more Western-like performance" is regarded as a higher level of proficiency. Maybe this is because music education in Japan has been centred on Western classical music for such a long time. Therefore, being Western, or having a higher degree of Western-ness or Westernization, could be seen as something equal to greater proficiency in terms of music ability. In this case, the degree of enculturation can be visualised as axis with two ends: one Japanese and the other Western. The 'Degree of Proficiency' axis indicates how much Japanese-ness has vanished and Western-ness has grown.

However, the Western way of musical expression is not the only goal for every musician. Even in music education in schools, this Western-centered idea is now disappearing. Western classical music is no longer the only music in education in Japan, (as mentioned earlier), though it still dominates. Teachers have been encouraged by the government to expose students to a broader range of music in schools (Ministry of Education, 1998). Above all, the Japanese way of musical expression (though the music is performed in whatever style) has been a certain style which has been adopted widely in Japanese society. Therefore, the degree of Westernization cannot be the only measure for proficiency in music education, especially for a comparison between Japan and other Western cultures.

When considering children's enculturation in their native culture, both axes for the Degree of Enculturation and the Degree of Proficiency start at close to zero, as

babies are neutral in their learning of any culture. The degree increases towards one goal as they begin gaining their mother culture in the learning process. This acquisition process is different from learning a foreign genre of music (as I mentioned above), as for example in learning their first language. Therefore, it may be easier to see how young children in two different cultural groups acquire their cultural style of music, and if it is happening in developmental stages (Figure 1. 1).

1.4. Plan of the study

1.4.1 Hypothesis

The rhythm of language and music within a culture might be in some form of relationship. As children's babbling gradually adopts the specific rhythms of their mother tongue, so young children's rhythmic forms in singing also become more closely associated with their cultures' dominant musical rhythm.

Age (the time span for learning) must be one aspect when we think about development. At a certain point, the babbling of a baby starts to form into a certain rhythm, which is the same as their mother tongue (Figure 1. 2). The babbling turns into clearer words at the next stage. Musical uttering also starts as babbling, and it forms into a certain musical style at some stage. This acquisition of speaking and singing is hypothesized as having a close relationship. The questions occurs here: 'How much influence is there between patterns in a culture's *language* rhythm and the same culture's patterns of *musical* rhythm?'; and 'How and when do children gain their

cultural musical expression?'. The answers are still unknown. Finding the answers to these questions is the goal for this study, related to be research hypothesis.

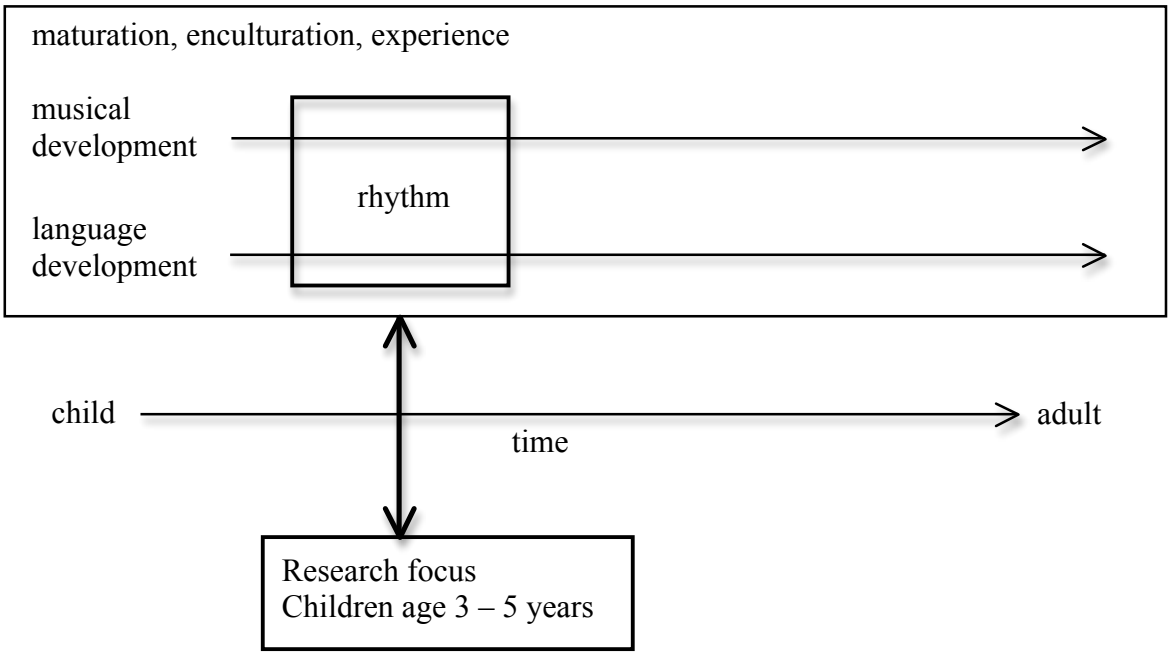


Figure 1.2 Hypothesis

As I discussed earlier, the degree of culture is better kept as one per culture. But it can apply to two cultures in the case of one's learning a foreign culture. This study is focused on the difference between two cultural groups (Japanese and English) in young children's acquisition processes in their mother culture, language and music. The targeted age was three-years-old to six-years-old. The starting point for both groups is believed to be neutral and quite similar, developing in different directions thereafter (Japanese and English). Theoretically, I have put Japanese-ness as one pole on the vertical axis and English as the other pole. An overlap between the two cultures (Western and Japanese) in hypothesized as considerable, but the ratio of the overlap is still unknown (Figure 1. 3). This overlap is considered to change along with the learning

process as the child grows older. The main focus is on Japanese children's development (regarding English groups simply for comparison purposes). The reason why English children were chosen as a comparison, is that there are many popular children's songs that are common in both Japan and in England.

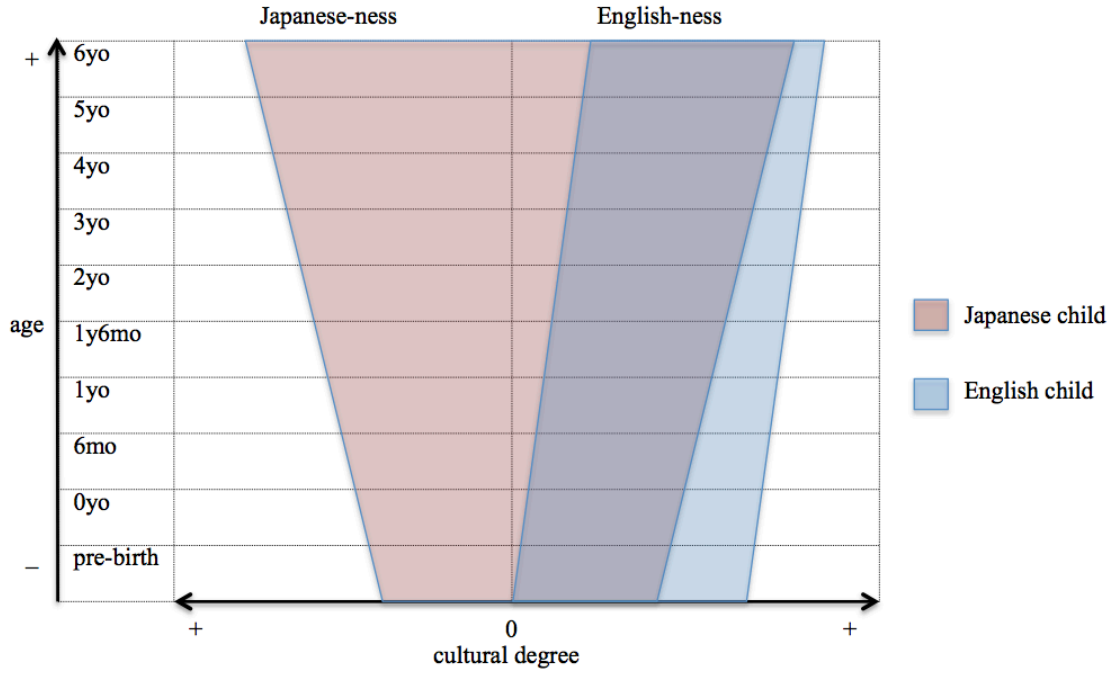


Figure 1.3 Theoretical model

1.4.2 Plan of the study

This study consists of four main sections; the first is literature reviews (Chapters 2 and 3), the second section focuses on the empirical data collection and analysis of children's actual singing (Chapters 3, 4, 5,), followed by a discussion (Chapter 6). The third section is analysis of printed music of children's songs in two cultures (Chapter 7). The

last part is the *warabeuta* rhythm reproduction by adult-students (Chapter 8), followed by an overall discussion of this study and implications (Chapter 9).

The literature review focuses on 'Early childhood musical development', 'Early language acquisition' and 'Links between singing and speaking', which are discussed in relation to both Japanese and English (or Western) studies. This chapter seeks to make explicit what is already known and found in previous studies, and to put some commentary on the different understandings in different cultures.

The data collection and analysis are the core of this thesis. First, there will be a discussion of the methodology of the study, and the analyses. There are three major analyses: 1) an nPVI analysis of common songs, 2) a rhythm analysis of printed young children's songs in Japanese and in English, and 3) a rhythm analysis of *warabeuta* rhythm reproduced from adult memory.

Chapter 2 Literature review: links between singing and speaking from an aspect of culture

2.1 Links between singing and speaking

Studies of children's early development suggest that music and language are interwoven. Infants' earliest vocalizations have musical qualities (variations in pitch, intensity, duration, timbre) and these utterances are explored, echoed and exploited by caregivers, forming the production of early speech (Papousek, H. 1996; Papousek, M. 1996; Malloch, 1999; Mang, 2003, 2006; Trevarthen, 2002). Singing and speaking for infants are not separate activities but have considerable overlap (see Welch, 2005 for an overview). Children aged between three to five years are often observed singing and playing with words in music-like formulae (Mang, 2003, 2006). At this early stage of life, the utterances of young children are not clearly distinguishable between what we as adults, perceive to be singing and speaking.

Even with adults, research suggests that musical and linguistic behaviours are linked, such as in studies of adults' musical performances (Ogushi, 2002; Sadakata, 2006) and empirical studies of composed music (Patel & Daniele 2003; Sadakata, 2003). People often form the fundamental components of many skills (including music) in their childhood. Deutsch et. al. (2004) found the influence of language early in life to be influential in the later musical perception of adults. There may be an influence on language rhythm in adults' production and perception of music rhythm. In other words, mother tongue may have a strong influence on forming one's musical performance and perception.

Singing and speaking can be regarded as representatives of musical and language activities, and can be considered as key tools in the development of music and language acquisition, interfaced with culture. In this section, several studies are reviewed that investigated links between singing and speaking rhythm.

2.2 Cultural differences in musical performance and perception

The impact of culture on musical performance has been the focus in many different studies in Japan and elsewhere (e.g. Ohgushi, 2002, 2006; Sadakata et. al., 2004; Patel&Daniele, 2003, Patel et. al., 2006; Murao, 1985; Minami, 2000). Several studies have demonstrated that people appreciate and are most sensitive to the musical structures of their own culture, rather than music from other cultures (Drake & El Heni, 2003; Hannon & Trehub, 2005; Iversen et. al., 2004). For example, the music synchronization performance of Tunisian and French subjects was analyzed using music from both these contrasting musical cultures. The participants synchronized at higher hierarchical levels (and over a wider range) with music from their own culture, rather than with an unfamiliar type of music (Drake & El Heni, 2003). The listeners from a Western and an Eastern culture, such as America and Japan, were found to group simple tone patterns in different ways (Iversen et. al., 2004).

Concerning musical production, cross-cultural studies of rhythmic production have been undertaken by Sadakata et. al. (2004) and Minami (2000). Sadakata et. al.'s study concluded that no difference was evidenced statistically between Japanese and Western (Dutch) performance in simple rhythmic pattern productions on a keyboard. In this study, Japanese and Dutch trained percussion players' performance of rhythmic

patterns consisting of two intervals with simple duration ratios of 1:1, 2:1, 3:1, 4:1, and 5:1 and reversed versions were examined. These patterns were performed in three different tempi and in two different conditions, one of which was musical and the other more mechanical. Participants were music majors (6) and professionals (6). Though Japanese participants were all students (both undergraduate and graduate), Dutch participants were all professional. In the results of this experiment, no difference was reported in the performance of the simplest rhythmic patterns. Nevertheless, Sadakata noted that there were still some differences between the two groups, e.g. significant differences in larger ratios (1:4 and 1:5). Skilled musicians in both groups could perform with high accuracy on the simpler ratios. The cultural difference appeared only when the task became more cognitively demanding.

Minami (2000) examined the handclapping motions of English native speakers and Japanese native speakers, and found a difference in rhythmic movements between the two groups. This experiment was undertaken to establish if there was sufficient statistical data to support evidence from other empirical studies on a "Japanese-style" of rhythmic behavior. (Or, in other words, a rhythmic musicality peculiar to Japanese). Six English native speakers and six Japanese native speakers who had no special music education were asked to clap whilst chanting a children's rhyme. The rhymes, '*One Potato'* for English participants and '*Lunch Box* [おべんとう obentou]' for Japanese were chosen for the experiment. The participants were equipped with a motor sensor system 'ATOM8' on their right wrist to measure speed of rotary motion. Additionally, the performances were video recorded. Then, the handclapping motion was divided into three categories, 'Close', 'Hold' and 'Open', for the analysis (see below). The results showed significant main effects for subject group and motion type. Handclapping motion was very different between the two groups. The differences

were (1) in the Japanese group, half the duration time was spent on a 'Hold' motion, and the remaining half was assigned to 'Close' and to 'Open' motions; whilst the English group's duration of a cycle of clapping motion was evenly spent among the three elements; (2) the 'Open' motion began before an upbeat for the English group, while the Japanese group started it by synchronizing to the upbeat; (3) the 'Close' motion in the Japanese group was quicker than that of the English group; (4) the 'Hold' motion in the Japanese group tended to be in a state of 'Stop'. From these results, Minami suggested that the clapping style of English speakers tends to be characterized as 'continuous' or 'circulated', and those of Japanese speakers to be a contrast between an 'enclosed' motion and a 'dynamic' one. English speakers needed to be aware of an upbeat so that they could control their drifting hands. On the contrary, Japanese speakers automatically opened their hands when an upbeat came, because they fastened their hands more firmly. Therefore, the Japanese did not need to be as conscious of the upbeat. The study provided evidence of culturally different behaviour and suggested a different inherent musical rhythm between Japanese and Western music (see details in chapter 3).

Cultural difference, especially the influence of language on musical perception, has been reported by research (Deutsch et. al., 2004). Deutsch and her colleagues found the influence of speech patterns heard early in life affected perceptions of musical tonal patterns in adults. Their study pointed to a strong link between speech and music, especially the first language speech pattern and a specific musical perception (tritone paradox).

Iversen, et. al. (2008) reported different rhythm perceptions on the same sound stimuli from different language groups: Japanese and American English speakers.

They suggested that not only language but also other auditory experiences early in life have some degree of influence on music perception.

2.3 Influence of language on musical performance and composition

Seeking similarity in the linguistic features of music has been a focus of several studies (Wenk, 1978; Patel & Daniele, 2003). The first researcher who undertook a quantitative study was Wenk (1978). He presented a new analytical technique for determining whether a linguistic input could be perceived that was related to the distinctive national character of French and English compositions. The analysis focused on temporal variables, and ratios of similar-to-the-language rhythmic groups. Both vocal and instrumental music were seen to reflect characteristic features captured in the trailer-timing/leader-timing[1] distinction recently proposed to account for rhythmic patterns in these languages.

Patel and Daniele (2003) also compared English and French compositions of Western classical instrumental music. This comparative study reported evidence of an influence, or more likely a possible 'leftover', of the composers' mother language in their musical works. The noticeable methodological progress in this study was that they applied the latest analysis of Grabe and Low's language rhythm classification 'normalized Pairwise Variability Index' (nPVI: see section which follows). Patel and Daniele chose instrumental music for analysis because they thought that to find a speech-music similarity in vocal music would not be surprising, given the textual

[1] 'Traile-timing' refers to the rhythmic character of French language. 'leader-timing' refers to

component in singing. The analysis was carried out on the music scores (music notation), not the performances. As a result, they found significant differences between English and French composers, which they argued reflected the underlying differences in the composers' mother language.

Huron and Ollen (2003) conducted a replication study of Patel and Daniele's study (2003). They enlarged the sample size of the English and French composer's music, from 318 to 1925. They examined 737 English themes by 27 composers and 1188 French themes by 52 composers. The result confirmed the difference between English and French themes. Therefore, it could be said that the influence of the composer's mother language rhythm was reflected in their composed music themes.

Patel and Daniele (2003) also conducted an nPVI analysis to seek a cultural trace, especially from the mother language rhythm, on music composition. This time they analyzed German and Austrian music to seek a historical perspective, namely the Italian influence on German and Austrian music. They analyzed the nPVI of 20 German and Austrian composers who were born between 1637 and 1895, and plotted nPVI as a function of time (birth year). The result showed a clear trend that nPVI value increased over time. The nPVI value nearly doubled over 250 years. The nPVI value in the earliest times was very low (see 2. 3. 1), which was in contrast to the nPVI value of spoken German language. It could be considered that the strong Italian influence on music at that time made the nPVI value low, but that the influence became weaker as time went by. They noted the importance of considering the role of historical influence, which may run counter to linguistic forces.

In a separate study, Sadakata et. al. (2006) compared Japanese and English pop music to see if there was an influence of the mother language. She found a language influence in the refrain phrases of the songs, but not in phrases of the whole song. She

supported the reliability of the nPVI analysis for this kind of comparative study which seeks to indentify linguistic characteristics of rhythmic features. The nPVI technique was introduced as a new approach to the empirical comparison of rhythm in language and music (Patel, 2003). "The nPVI … measures the relative variability in a set of durations and can be applied to event durations in language (e.g. vowels) and in music (e.g. musical tones)." In all the studies above, namely the Patel and Daniele's, Hurron and Ollen and Sadakata's studies, the nPVI analysis was undertaken on the written music scores.

2.3.1 The typology of language and nPVI

The typology of language rhythm has been a focus in linguistics for a long time. According to Stockmal (2005), Pike (1945) classified languages by their rhythm into two groups: stress-timed and syllable-timed. French and Finnish are classified as syllable-timed languages, while English, German, Dutch, Russian, Czech, Italian, and Spanish are stress-timed languages. Abercrombie (1967) later added mora-timed languages to Pike's classification. Japanese and Luganda languages are classified as mora-timed languages. Subsequent research has challenged this categorization. For example, Dauer (1983, 1987) suggested that phonetic and phonological criteria must be explicit for identifying the rhythmic structures of languages. Dauer also said that properties such as the length of accented syllables, syllable structure, the function of pitch changes, and the quality of vowels in unaccented syllables could be scored.

Ramus, Nespor and Mehler (1999) started using SD (standard deviation) of the proportion of vocalic intervals, and the variability (standard deviation) of consonantal and vocalic intervals within sentences for the rhythmic classification of

language. Soon after, Grabe and Low (1999) introduced a new rhythm index which is calculated from the absolute value of differences in vowel duration in successive syllables, divided by the average duration of the pair. For example, the rhythm index values across language by Grabe et. al. (1999) were reported as follows (Figure 2.1),

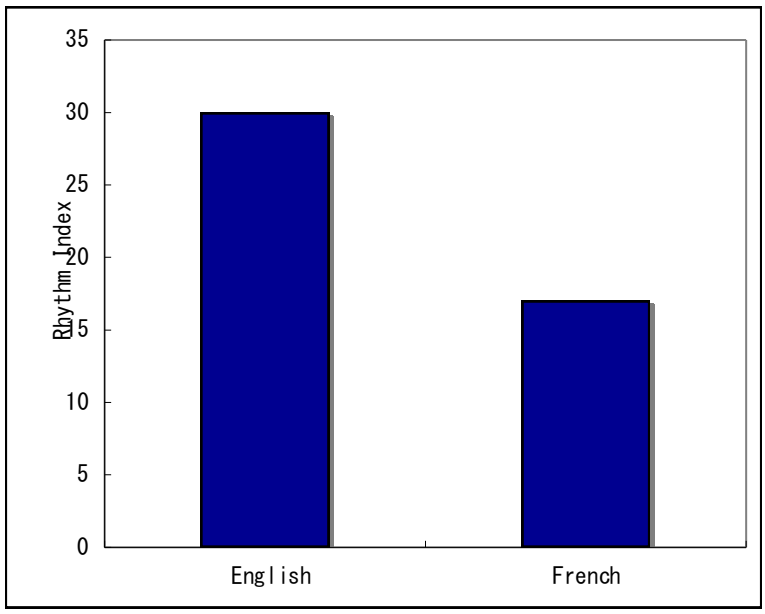


Figure 2.1 Grabe et. al.'s (1999) Rhythm Index values across languages

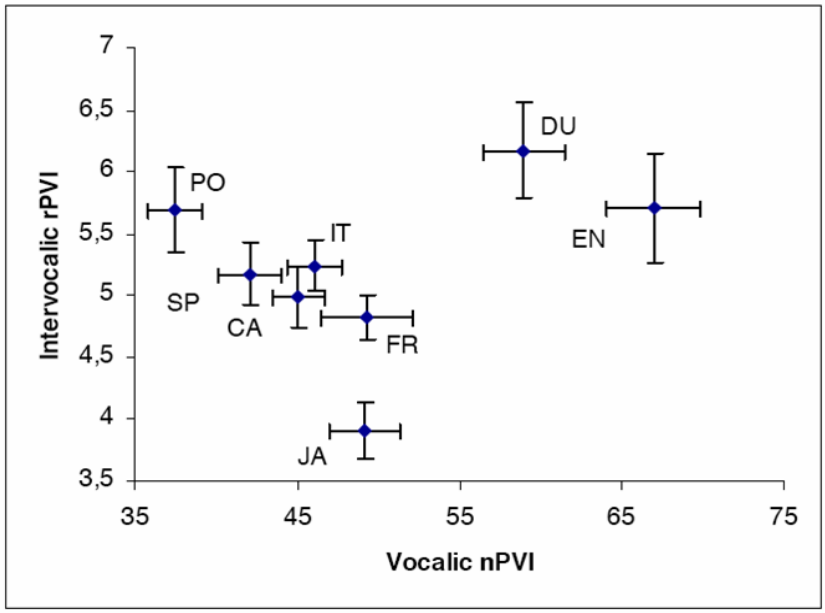
This rhythm index was later called PVI (Pairwise Variability Index). In this study, differences in language development in rhythmic aspects were examined. (The details of this study will be discussed in the later section of this chapter.) The nPVI measurement was first introduced in a study of the rhythmic classification of language (Grabe & Low, 2002). It was invented as a new way of classification, using Pairwise Variability Indices (PVI). Grabe (2002) then added a second dimension. The vocalic dimension is now known as nPVI and the consonantal dimension as rPVI (Grabe and Low, 2002) (figures 2. 2 and 2. 3).

$$nPVI = 100 \times \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| / (m-1) \right]$$

m=number of vowels in utterance

d=duration of the kth vowel

Figure 2.2 Formula of the nPVI



Stress-timed languages: EN=English, DU=Dutch. Syllable-timed languages: PO=Polish, FR=French, SP=Spanish, IT=Italian, CA= Catalan. Mora-timed language: JA=Japanese.

Figure 2.3 Ramus (2002) Intervocalic raw Pairwise Variability Index vs. vocalic normalised Pairwise Variability Index

Phonological units, such as inter-stress intervals or syllable duration were not used as measures in this study, though these were common measures in former studies. Instead of phonological units, durations of vowels and the duration of intervals between

vowels (excluding pauses) were measured. The results indicated that there was a weak categorical distinction between stress-timing and syllable-timing (Figure 2. 3). Not all languages fitted into that distinction. Japanese was reported to not be in a rhythm class of its own, and was classified as similar to syllable-timed languages, even though Japanese had been classified as a mora[2]-timed language in former studies (Abercrombie, 1967). The vocalic *nPVI* and the intervocalic *nPVI* indicated different aspects and were demonstrated in the 2002 study to be eligible for language rhythm classification. The linguistical challenge to find an applicable measurement of rhythmic classification for all the existing languages was progressed by this study, though there were still some problems left unresolved.

The problems in using nPVI for Japanese language relate to devoiced vowels, written as 'つ' in Japanese letter hiragana. The sound was given as one letter and counted as one syllable for rhyming or in poems, although it is a non-pronounced sound. Double-vowels are counted as one syllable in many languages, such as English and German, but each vowel is given one letter in Japanese and considered as two sounds (syllables)/morae. Grabe and Low (op. cit. p 525) note the problems of devoiced vowels in English and Japanese. In their analysis, acoustic units were applied for the measurement, not phonological. Therefore, those devoiced vowels which could be considered as the phonological features of the focus languages were not measured. The double-vowel problem (p. 526, i.e. one sound in English, but two in Japanese) was considered to be a bigger issue in Japanese language analysis. In theory, Japanese language has the simplest phonetic structure; therefore, in their study, a low vocalic

[2] mora = phonetic unit, but is not the same as a phoneme, is the smallest pronounceable unit in the Japanese language. For example, 'McDonalds' [in English] has three syllables compared to McDonalds [マクドナルド in Japanese] which consists of six morae.

nPVI value is to be expected. However, the devoiced vowels and the double-vowels created problems in the nPVI analysis results.

The Japanese text used in the experiment consisted of 16% devoiced vowels. There might be a gap between acoustic sound of speech and the human perception of speech, at least for humans' perception of the language rhythm, especially to one who knows the writing system of the language (Grabe & Low, 2002).

Because nPVI was developed to reveal the underlying prosodic/rhythmic features of vowel sounds in a language, it is of interest to the current study as a potentially useful tool to investigate rhythmic features of singing.

2.4 Empirical studies in Japan

2.4.1 Concept of singing songs, rhythm, and communication: closer links between music and language in studies in Japan

The possibility of a close link between language and music has been a common focus for research in Japan, because of the interest in seeking to understand the philosophy, theory, and aesthetics of one's own culture. Many researches have been undertaken with the basic idea of connecting music and language, especially concerning the rhythmic features of language/literature; not only in the field of music (Nakai, 1975; Ogura, 1977; Fujita,1976; Yamada, 1988; Koizumi, 1984), but also in other varied fields, such as linguistics, literature, philosophy and aesthetics (Bekku, 1977; Kindaichi, 1988; Sugaya, 1975 and other studies).

It seems that it is a natural Japanese way of thinking to connect language and music. Singing and speech are not perceived to be separable literally. The word *uta* [う

た in Japanese] has several meanings according to a Japanese dictionary "Kojien" in its 2003 edition; (1) a prayer to god, (2) a poem with rhyme, (3) *waka*/*tanka* [和歌/短歌: a 31-syllable Japanese poem], and (4) a song (Kojien 2003). The verb 'singing' has a broader meaning than in English: such as *utau* [歌う:sing, 謡う: recite a poem, sing a tune without instrumental accompaniment, 詠う: recite or make a poem, 唄う: sing a Japanese traditional song, 謳う: express, state, extol, sing the praises of something]. As can be seen in the previous sentence, various Kanjis are used for the Japanese word 'utau'. Each Kanji has a slightly different meaning. Especially, in the reciting of a poem 謡う, the concept of 'singing' is different to that in English. Japanese lyrics have priority compared to the melody. Uta can be defined as uttered words which have a melody and rhythm.

Another example can be seen in Nakayama's study (2001) '*A comparison of vocal expression in Japanese traditional and western classical-style singing, using a common verse'*. Nakayama collected sound sources from various traditional Japanese singing styles and Western classical vocal singing style in common verse. The common verse was sung/ recited in various different ways of vocal performance, embracing 32 different styles in Japanese singing and Western style vocal singing of soprano, mezzo-soprano, alto, tenor, baritone, and bass singers. The resultant recorded sound outputs were designed to be accessible for schools and for academic researchers as a vocal data base. An analysis was carried out to see if there was a characteristic singing style in Japanese compared to Western singing. The results suggested that the difference between Japanese and Western singing was as follows: (1) more varied timbre and vocal quality were employed in Japanese singing than Western singing, (2) the nature of the transition process of tones, especially from a vowel to the following consonants, took a longer duration in Japanese singing, while the transition process was always of a

shorter duration in Western singing, (3) the singers used different timbres for different roles in Japanese singing, (4) the transition "natural voice→falsetto→natural voice" is common in Japanese singing but not in Western classical music, (5) the first two notes of each phrase were sung shorter than the following tones in Japanese singing; this pattern was commonly found only in Japanese, (6) a gap between the timing of the tone transition and vocalization was made deliberately in Japanese singing; this was a common technique in Japanese singing, but the timing of tone transition and vocalization were simultaneous in Western singing. From these results in Nakayama's study, it could be concluded that the idea of "singing" has a more diverse interpretation in Japanese culture than Western. Consequently, songs and poems are considered to be the same field of study, as are music and language.

2.4.2 Close links between music and language, and seeking the fundamental phonetic/prosodic unit of the Japanese language

Studies in the field of linguistics have also been undertaken with the idea that singing and speaking are closer in Japanese. Japanese linguistics researchers used this hypothesis for investigating the prosodic/rhythmic units of Japanese language, which has been an issue in the field of linguistics (Sugito, 1997; Sugito & Sakai,1999; Tanaka, 1999; Kubozono, 1999a, 1999b; Fukumori, 2001). For example, Sugito (1997) undertook a large project on Japanese speech which was funded by the Ministry of Education, with the findings published as a book: '*Japanese speech 2: Accent, intonation, rhythm and pause*'. The findings of this project reported the importance of morae and syllables as phonetic units in Japanese. The outcome of this project stimulated linguistic reserchers to investigate further aspects of prosody and the phonetic system of the Japanese lanugage. Some of the researches were undertaken

using songs to explore the underlying prosody and phonetic systems (e.g. Sugito & Sakai, 1999; Tanaka, 1999; Kubozono, 1999b). Using song material to seek or explain prosodic and phonetic systems in the Japanese language is common among Japanese linguistic reserchers (Kindaichi, 1991; Jouo, 2001; Kubozono & Ohta, 1998).

Sugito and Sakai (1999) analyzed Warabeuta (traditional Japanese children's play songs). In their study, the songs were sung by elderly women (from memory) to demonstrate the structure of Japanese moraic units. They collected the songs from Tokyo and the neighbouring areas of Hidaka-cho and Osaka. They examined both the musical transcriptions and the acoustic sounds to find out the status of individual mora versus syllable groupings. They found evidence in warabeuta from Osaka to suggest that moraic rather than syllabic structure has an important role in Japanese prosody. Their reserach was undertaken in the context of studying Japanese language through the framework of Western thought in both music and linguistics.

Tanaka's study in 1999 analyzed Jiamari[3]-Senryu poems and cheerleader songs for baseball matches to examine a role of bi-moraic units in four-mora templates, which have an important role in underlying rhythmic formation. The results suggested that the role of syllables in four-mora template effects not only Ji-amari Senryu, but also various other linguistic phenomena, including rhythmic formations in baseball cheerleader songs. This study was also designed around the idea that there is a close link between songs and poems, as in music and language.

The linguistics researcher Kubozono also undertook research based on the idea of a link between music and language. Kubozono (1999a) used example songs to explain the role of mora in Japanese in his textbook '*Nihongo no Onsei'*. In this book, he emphasized that morae were fundamental prosodic units in the Japanese language,

[3] Jiamari means the redundancy of mora(e) in a metrical line.

and noted that the syllable must be regarded as the second prosodic unit. He confirmed this idea in his further study (1999b). He analyzed word-tune relationships in one hundred J-pop (Japanese popular) songs to examine the relative importance of the syllable and the mora as segmentation units in Japanese songs. He reported that both syllable and mora serve as relevant segmentation units. The moraic status of segments in Japanese is determined by the principle of sonority[4], widely accepted in general linguistic theory. This conclusion was based on the idea that prosodic and rhythmic rules in the lyrics of songs and in language were the same.

Improvements in computer technology and software have also brought benefits to acoustic analyses in linguistics studies (e.g. Fukumori, 2001). Fukumori (2001) stated that there was a problem concerning the definition of "mora" in previous studies (Kubozono, 1998; 1999). Fukumori classified four functions of mora (1) as the unit to measure the phonetic length of words, (2) as the unit to measure the prosodic length of words, (3) as the unit to divide a word into its constituent parts, and (4) as a fundamental unit of rhythm in verse. This extended Kubozono's original (1998, 1999) classification which encompassed (1) to (3), but no mention of (4). Fukumori also referred to past studies of acoustic experiments on speech, length/duration of mora (拍 *haku* in Japanese). Then he compared the findings of these acoustic studies, ERP (event-related potential) studies, and also of experimental perception studies (sound-letter relationships). He concluded that mora consist of many factors, such as duration, pitch, and amplitude, and that these elements are complexly unified in the management process of speech, and that there was the necessity for more study in this area. More

[4] Kubozono (1999b) used the word 'sonority' as a minimum pronounceable sound unit of the language.

importantly, an understanding of the complex function of morae is necessary to explain the nature of fluent Japanese speech, especially for learners.

From the lingusitics studies, morae can be considered as a key element of prosodic/rhythmic structure of the Japanese language, and by implication, a similar importance is likely to be found in music. The differences between the fundamental prosodic units, such as morae and syllables, could be considered the reason for the rhythmic difference of the language. This idea could be extended to music. This fundamental linguistic difference could be an explanation for the different practice concerning musical beat, metre and rhythm in Japanaese traditional music (see following section).

2.4.3 Differences between Western and Traditional Japanese music

Nakayama's study (2001), as mentioned in the previous section, demonstrated that various ways of singing exist within Japanese traditional culture, compared to Western culture. Japanese ethnomusicologist Koizumi's study of rhythm in traditional Japanese music is commonly accepted in Japan. He said that the rhythm in traditional Japanese music has a 'front beat' [omote[5]-haku 表拍 in Japanese] and a 'rear beat' [ura[6]-haku 裏拍](Koizumi, 1984, 1994), and that these cannot be separated. Therefore, most Japanese music is in 2 or 4 metre. This conception of beat is different from Western music, which is commonly characterized as having strong- and weak-beats (Koizumi, 1984).

This difference matches the linguistic differences reported between moraic and syllabic languages, such as Japanese and English. Kubozono and Ohta (1998)

[5] omote 表: front, surface, right side, outside, head (side of coin)
[6] ura 裏: back, underside, wrong side, inside, reverse of a coin

defined the difference of prosodic structure and accent between Japanese and English as in the table below (Table 2. 1).

Japanese	*English*
Mora language	Syllable language
Open syllable language	Closed syllable language
Pitch accent	Stress accent
Word-pitch language	Intonation language
Syllable-timed rhythm (mora-timed rhythm)	Stress-timed rhythm

Table 2.1 Comparison between Japanese and English (Kubozono & Ohta, 1998)

Koizumi (1984) explained that, as a mora language, Japanese has a pitch accent, but not a stress accent. He suggested that strong- or weak-beats hardly exist in traditional music. This theory developed from several linguistic studies (Bekku, 1977; Sugaya, 1975; Kindaichi, 1988).

The differences have been studied concerning the language by researchers in linguistics and ethnomusicology and defined as follows (Kindaichi, 1988; Bekku, 1977: Sugaya, 1975; Koizumi, 1984): In Japanese traditional music, (1) equally-timed beats are more commonly used, (2) there is limitation of the number of letters/morae on each musical note, (3) one or two letter(s)/mora(e) on one music note are common, (4) the second letter/mora should be weakened if there are two letters on one note.

In the late 90's, after 'mora' became commonly used as a fundamental phonetic unit in Japanese linguistics studies by Kubozono (1998), some studies were undertaken for further research on the influence of language rhythm on music, and vice versa (Kubozono, 1999; Tanaka, 1999; Murao & Azechi, 1999; Azechi, 1998, 2001).

Murao (1988) introduced the 'Tago-beat' theory of Japanese musical performance behaviour, which also accepted and extended Koizumi's 'front-/ back-beat' theory (1984, 1994). Tago-beat refers to a rhythmic emphasis that is common in Japanese music performance, and is how they report feeling the beat struck and stopped at a landing point. He discovered this Japanese rhythmic behaviour (Tago-beat) while he taught Western classical music to his university students. He considered the Tago-beat schemata as one that is disturbing for Japanese students in the acquisition of Western style musical rhythm. Since his report and definition of Tago-beat, Japanese rhythmic behaviour has been a focus of further studies (Murao, 2000; Minami, 2000; Shinzanoh, 1997, 2003). Shigeshita (1988) suggested dividing Tago-beat into two categories, such as *suriashi* [摺り足: a style of motion in traditional dancing and play, which the performer's feet slide along. A style of motion that is sublimated to be artistic and extraordinary] and sticky rhythm [ベタつきのリズム: sticky rhythm, an less experienced rhythm and rhythmic motion]. Shigeshita reported that Murao's definition of Tago-beat mixed up two different forms of rhythmic behaviour, assuming that Murao meant Tago-beat as a rhythmic behaviour in Japanese music.

Shinzanoh's studies (1997, 2003) reported on the process of acquiring Western music rhythmic behaviour among junior high school students. These were studies of school brass band players' Westernization during the introduction of musical rhythm. In his study of 1997, 32 junior high school students were asked to match their foot tapping to metronome sounds which were presented in two tempo (MM=66 and 108). All the trials were recorded on video for analysis of any timing gap between the foot tapping and the metronome sound. From the results, Shinzanoh categorized the participants into five groups according to the level of tapping match skill: Group 1: performers who can perceive the tempo presented and the gap between

the foot-tapping, and can control their body motion to match them, Group 2: performers who can perceive the tempo presented and the gap between the foot-tapping, and almost all the time can tap in tempo, but sometimes lose control of their body motion, Group 3: performers in the process of gaining an accurate perception of the tempo presented and the gap between the foot-tapping, but who cannot control body motion, Group 4: performers who lack the skill to perceive the tempi presented and the gap between the foot-tapping, therefore cannot control their body motion, Group 5: performers who do not understand a concept of tempo. In the 2003 study, Shinzanoh picked the most advanced group (Group 1) of students to seek the difference between experienced marching band performers (28 students) and non-experienced performers (30 students). The performers were asked to keep stepping to mark the tempi in one place. The trials were video recorded for analysis. The results show different sequence patterns of stepping between the two groups. The experienced performers' group showed stepping, which picked the foot up on the beat. It tended to start with the lifting leg motion timed to coincide with the beat. The non-experienced group showed a stepping pattern in which the beat and treading on the floor coincided. Therefore, members of the non-experienced performers' group marching looked as if they were a little delayed to the sound of the beat. Shinzanoh also examined experienced and non-experienced conductors motion in a 2004 study, and found a similar "delay" in non-experienced conductors. Overall, the data revealed the process of gaining a new (to the students) musical style of behaviour, and their struggles to acquire the new style. Shinzanoh suggested that the underlying rhythmic schemata, which developed through their musical lives from childhood, were disturbed by their Western music learning. His studies showed the difficulty that Japanese students/learners have to acquire rhythm in

Western cultures, which is caused by the different rhythmic schemata between cultures, especially between Japanese and Western culture.

2.4.4 Warabeuta studies: Japanese children's play songs

It has been considered that the music which people were familiar with in their childhood influenced the formation of their musical schemata, therefore studies on children's' songs have been undertaken by several researchers (Koizumi, 1984, 1986; Kojima, 1976; Washizu, 1997; Iwai, 1998; Sugito & Sakai, 1999; Kawai, 2002; Ikeda, 2002).

One major field-based research among a large number of warabeuta studies was carried out in the 1960's by Koizumi and his students (Koizumi, 1986). They visited over a hundred elementary schools in the Tokyo area and collected as many examples of *warabeuta* songs as they could. Koizumi reported that it was quite easy to find broad types of *warabeuta*, even though teachers and the other adults said that children nowadays did not sing *warabeuta* at all. At that time, most adults and teachers believed that *warabeuta* to be a disagreeable, or undesirable song form for children. They preferred children to sing new Western style songs composed for an educational purpose, the so called *shoka*[7] 唱歌 and *doyo*[8] 童謡.

Koizumi stated in his writings (i.e. 1984, 1986) that all of the basics of traditional Japanese music are to be found in *warabeuta* songs. In his last book '*A Study of Traditional Japanese Music: volume 2 Rhythm*' (1984), he elaborated the sixteen typical rhythmic patterns in *warabeuta* as a first step in developing a rhythmic theory

[7] *Shoka*: children's songs that were edited by the Ministry of Education in the Meiji era (1868 - 1912) for educational purposes. *Shoka* songs were publibished as music text books.

[8] *Doyo*: Children's songs that were composed in a Western musical style since the Taisho era (1912 – 1925). There are also many traditional Japanese musical elements in *Doyo* songs, especially in the unique songs.

for the entire genre of traditional Japanese music. Though he could not finish his work, his theory was adapted, and has given inspiration and fundamental theory to later studies (Azechi, 2001; Murao and Azechi 1998.).

Kojima (1976) collected *warabeuta* in many places and stated that *warabeuta* are still vividly alive amongst children, even though authorities had once hesitated to allow her to undertake the fieldwork, saying 'In our school, children do not sing *warabeuta*'. The authorities disapproved of warabeuta, regarding them as too out-of-date to be the basis for children's educational singing materials. In one research project in Okinawa, she collected over 50 *warabeuta* songs in two hours from 8-/9-year-old girls. None of the *warabeuta* songs were Okinawan *warabeuta*, but they were from the main island.

Contrary to the *warabeuta* study in the 60's and the 70's, Washizu (1997) was concerned about the decreasing opportunities for the transmission of *warabeuta* songs among children, and also from adults to children in Japanese society. Her interest was to find a reason for the difference between the decline of *warabeuta* compared to the wealth of nursery rhymes found in England. She came to London to study children's play songs, for the purpose of comparing Japanese *warabeuta* songs and English nursery rhymes (Washizu, 1997). In her study, she did not find an answer to the question that she had set herself, but she found many differences between English children' songs and Japanese *warabeuta* songs, especially regarding the 'language-rhythm foundation' [言語リズム素] and the 'language-melodyline foundation' [言語旋律素] of Japanese and English language. Her study focused more on linguistic aspects than music. She tried to demonstrate the existence of language rhythm in young children's singing behaviour, based on her hypothesis that 'language-rhythm foundation' [言語リズム素] and the 'language-melodyline foundation' [言語旋律素] were the

elements which showed the characteristics of the language. She concluded that the internalization of the mother tongue's language-rhythm was consistent with the process of acquiring the mother culture. She now practices her own English pedagogical method (teaching certain English language rhythms to children using English nursery rhymes) in teacher-training courses in Japan.

Iwai's (1987, 1998, 2001) fieldwork on *warabeuta* research were undertaken in Shikoku and Kanasai area since 1970, every ten years. He reported the influence of the changes in children's living environments on their songs. He expected to report the decline of *warabeuta* songs for his 2001 fieldwork, because of children's reduced opportunity to see nature, because of the shift in population into urban areas, the influence of mass media and a greater standardization of the culture. He confirmed some decline of *warabeuta*, with a smaller number of songs surviving and some genre of sing-along-play having disappeared. However, he found some new variations of children's popular songs and a revival of an old song which was reported to have died thirty years previously.

There has been a large amount of research into young children's musical activities. Music, especially singing, has been considered a very important activity in young children's development. Many of these studies were made by nursery teachers and, in most of the cases, Junior college researchers, every year. These studies reported the important role of music activity in young children's development.

Overall, there is a wealth of literature to suggest that there are strong cultural links connecting singing and speaking to the underlying features of the mother tongue.

Chapter 3　Early childhood musical development and early language acquisition

This chapter reviews previous studies and writing on early childhood musical development and early language acquisition. This section consists of four sections: 3. 1 Theoretical constructs; 3. 2 The boundary between singing and speaking development in infancy; 3. 3 Studies of singing in the musical development of school age children and the influence of environment, society, culture and language; and 3. 4　Language and music development policy in Japan.

3.1 Some theoretical constructs: Concerning Culture and Development: Ecological Systems Theory and a Russian Dolls Model

One critical factor that arises in many studies of young children's development relates to the children's environment. All the socio-cultural contexts, such as family, school, friends, parent's working environment, the area where they live, and the social environment, are perceived to have some degree of influence in shaping the children's identities, personalities, and behaviours, including their musical development. As an example, there are two theoretical models, which illustrate the various influences on young children's musical development, language acquisition, and enculturation. One is Bronfenbrenner's Ecological Systems Theory (1979), which introduced a bio-ecological approach to human development. The other is a 'Russian Dolls' type model of the influences in early childhood musical development (Welch, 2006).

Bronfenbrenner introduced his Ecological Systems Theory in 1979 and considered development to be continuously changing in the ways that humans adapt and cope with their surrounding environments. He delineated the various environments around the child into four types of nested systems, embracing what he termed as the microsystem, the mesosystem, the exosystem, and the macrosystem. The microsystem is the closest layer and core within which the child is placed. The most immediate and earliest influences are the family and siblings. In the mesosystem, local influences on the child derive from the neighborhood or community institutions, such as the school, religious institutions, and peer groups, as well as the specific culture with which the family identifies. The exosystem is seen as the external environment that indirectly influences the child's development, such as the parental workplace and community-based family resources. The macrosystem is defined as the outermost layer of the child's environment, and includes cultural values, customs, and laws. The chronosystem was added later, introducing the dimension of time as it relates to the child's environment (Bronfenbrenner, 2005). From this theory, the influence of the mother, although of prime importance, is not the only factor to be considered in the young child's development. Additional account needs to be taken of the culture within which the child lives, and other factors that have some social and cultural importance.

A 'Russian Dolls' type model has been suggested for best conceptualizing the literature on the nature of the influences in the early childhood musical environment (Welch, 2006). This model also has a nested-style design in which individual musical behaviours are shaped. The ontogenesis and basic human neuro-psychobiological design (including the potential for musical behaviour) is at the core, and the layers (from inner to the outer) relate to enculturation, generative musical skill development, schooling, the influence of special groups (such as peer groups, genders or ethnicity),

and musical development that is shaped by the educational imperatives in the wider community. This model was designed to show the way that musicality is shaped in a child, and it can also be used as a framework to investigate the position and the relative importance of outcomes and findings of research in young children's musical development. Therefore, this model can be useful for mapping out the great number of findings obtained in previous researches. For this study, the most important suggestion from the Russian Dolls model is that enculturation is the closest layer to the core (the central 'ontogenesis and basic human neuro-psychobiological design' part of the individual), and closely allied to generative skill development. The core part, the "ontogenesis", is derived from nature, while the other layers are all formed by influences from the outside world interacting with the core: something to learn, to acquire, to nurture etc. It suggests that enculturation is the most fundamental part, and it starts at a very early stage of musical development.

In looking at these two models, culture is treated as one of the layers that have an important degree of influence on the young child's development (Bronfenbrenner, 1979; Welch, 2006). Culture is also evidenced in early mother/carer-child interactions. 'Motherese' (parent-infant direct speech) is considered to be one of the most influential factors in the formation of young children's musical behaviour, as well as in their language acquisition (see below). The mother's (or caregiver's) cultural background might also have an influence on the children's development, as musical features in adult speech have some influence on early language development that is closely linked to these musical features.

Motherese is described as one form of language that is used between mother/caregivers and infants. It contains rich musical features, such as a predominance of musical pitch intervals, and correlations between motherese and language

development (as well as musical development) have been reported in various studies (such as Papousek, M., 1996; Fassbender, 1996). Motherese is also known as 'parentese', 'care-giverese' and 'child-directed speech'. It contains paralinguistic features such as high pitch, exaggerated intonation, a greater range of pitch variation and words spoken at slower tempo. (Riken 理化学研究所 http://www.riken.jp/r-world/info/release/press/2010/100810/index.html)

Trehub (2006) used the word 'maternal speech' and 'infant-directed speech' for motherese, and described it as follows;

> 'Maternal speech has a larger pitch range and greater dynamic range (whisper to loud) than ordinary adults' speech, which may contribute to infant preference.' (Trehub, 2006, p.40)

She noted that infants respond to infant-directed speech with greater attentiveness and a more positive affect than they accord to adult-directed speech, that is, speech between adults. However, it is still unclear which aspects of maternal speech attract and maintain infants' attention. Trehub also defined musical aspects from motherese and labeled this as 'infant-directed singing'. She described 'infant-directed singing' as follows:

> 'The distinctiveness of infant-directed singing goes beyond the repertoire, or *what* the mother sings, to *how* she sings. In general, North American mothers

sing to their infants at a higher pitch level and slower tempo than they usually use for the same songs [elsewhere]' (Trehub, 2006, p.39)

She noted that infants prefer infant-directed singing to other styles of informal singing from the earliest days of life. The elevated pitch level of infant-directed singing may contribute to infant preferences.

The influence of 'motherese' on infants' musical development has also been reported in researches (Papousek, M., 1996; Fassbender, 1996). Papousek, M. (1996) called 'motherese' 'infant directed speech' and defined this as follows:

"Infant directed speech, parents intuitively guide infant vocalization towards melodic modulations, display prominent models for them…, and use the melodic profile of infant-directed speech as the first categorical messages about the infant's momentary vital circumstances." (p. 44).

Papousek, M. also said that infant-directed speech can be used by the infant as a form of vocal play, later leading to singing. Parents' infant-directed speech uses melodic contours for vocal play as well, and they often sing nursery rhymes or lullabies. Musical elements are evidenced in the vocal productions of babies aged 2-15 months during vocal interaction with their mothers (Papousek & Papousek, 1981). Fassbender (1996) summarized the importance of 'motherese' thus: 'The acoustic environment in the uterus and the post-natally experienced motherese provide frames to signal and teach the infant the important markers necessary to segment and structure speech and

music' (p. 80). Therefore, motherese can be considered as the first step in learning to imitate nursery rhymes, and perhaps as a stimulus for the improvisation of a child's own songs, and later an impetus in learning songs with lyrics.

The influence of 'motherese' on infants' language development has also been reported in research (Leveitt et. al., 1991). They found same rhythmic features as participant infants' learning language (mother tongue) in the reduplicative babbling. In French and American infants' babbling, all three of features: final syllable lengthening, timing of non-final syllables, and number of syllables per utterance, showed the same tendency as in the adults' speech. The researchers found evidence for language-specific rhythmic influences in motherese. It could be said that, through motherese, infants acquire the rhythm of mother tongue.

3.2 The boundary between singing and speaking development in infancy

In this section, the infant study literature is mainly focused on exploring the boundary between singing and speaking, in terms of child development. Therefore, mother-infant level communication is central to this discussion. It comes under the core ontogenesis element and the inner two layers of 'Enculturation' and 'General musical skill development' of Welch's Russian Dolls type theory (Welch, 2006). Research literatures were reviewed below to examine what was found regarding infants' and very young children's acquisition in singing, speaking and enculturation.

Researchers in music development had been trying to define infants' 'musical' vocal products from their monologues, which are a form of speech. Moog (1976) distinguished babies' earliest vocal response to music into two types, 1. Vocalizations, and 2. Musical babbling. Moog defined vocalizations as 'first, the chuckling and 'crowing' of infants when they express pleasure, and secondly, the 'babbling monologues' in which they may show their enjoyment, either during or after the performance of a piece of music.'(p. 59). Musical babbling was described as showing delight in sound, and lacking in words. He also concluded that the difference between speech babbling and musical babbling is as follows;

> Speech babbling is produced in the six or seven months old infant by talking to him; musical babbling only occurs if music is sung or played to him. (ibid)

It is simple and clear: there are stimuli (whether music or speech), which provoke the infant's babbling, whether the baby's response takes the form of speech babbling or musical babbling.

The Japanese researcher Shimura (1996) found traces of the development of both speech and music among two-months-old infants' vocal sounds. She used 60 samples of infants' vocal sounds to discern how adults perceived them. The sound samples were judged by 15 adult participants and classified into three oppositional categories: 'comfortable-uncomfortable', 'calm-surprise' and 'singing-speaking". The results indicated that the 'singing' had a shorter sound duration, a smaller amount of segmentation, higher pitch and a larger pitch range than "speaking". The 'singing' had

some similarity with the ‘comfortable’ vocal sounds, but the difference was in the segmentation: ‘singing” had less segmentation than in the ‘comfortable’ categorisation. She concluded that there were factors of development in ‘language sounds’ and ‘singing’ in two month old infants’ vocal sounds. This study suggests that the vocal sound of two-month-old infants already contains elements which are necessary for communication, and also that ‘singing’ includes emotional information.

Minami (1999) investigated the boundary between uttering words and singing through observation of a girl during her development from 1 year and 4 months to 2 years and 5 months. She examined 60 examples of the girl’s vocal sounds, which were video-recorded at her home. From the observation and analysis of the 60 examples, she concluded that (1) spontaneous singing was seen at the age of 1 year and 4 month, and the cases in which the uttered word was used for a following song occurred at the age of 1 year and 7 months (which was the age the girl started to use two word sentences); (2) the uttered words turned into songs easily when the girl’s demands for transmitting the meaning of the words was low. Conversely, those words uttered with a strong demand for transmitting meaning, lost their function as words that turned into words; and (3) the presence of a rhyming aspect to repeating songs, or a monologue-style utterance was the cue to cause singing. She reported details of the influences between language development and singing, and concluded that the process of language acquisition is an important phase for spontaneous singing.

The boundary between singing and speaking is still quite ambiguous in young children, although researchers have been trying to differentiate between these in their studies of infant musical development. For example, children’s vocal play has rich musical features, such as melody-like pitch contour, rhythmically repeated words and phrases. These musical forms are also somehow affected by their mother language

(Mang, 2003, 2006). Mang investigated the effect of age, gender and language on singing competency in over 60 Cantonese monolingual and 60 bilingual (English and other language) children aged 7 and 9. Children's singing on a criteria song "Happy Birthday" was scaled using two rating scales, using Welch's Vocal Pitch-matching Development model (2000) and Rutkowski's Singing Voice Development Measure (1988). The total score of both measurements by two judges were added together for the analysis. Her findings showed the significant effects of gender and language in singing competency. The Cantonese monolingual children's score in singing was high on both individual rating scales, and total score. The tonal language Cantonese monolingual children performed better in their scores than the English bilingual children in the assessment of melodic singing accuracy and the use of singing voice. This could be evidence of some relationship between language and singing ability in young children's musical development.

The relationship between speaking and singing could also apply to aspects of rhythm. There may be some relationship between language rhythm and musical rhythm in young children's musical development. As a baby's babbling begins to shape itself into the form of a certain language, i.e. their mother tongue (e.g. Eimas, 1971), it may also be influenced by the rhythmic patterns existing within its own musical culture. For example, as the babbling of children who have been brought up in a Japanese environment gradually acquire basic features of Japanese language rhythm, it may be observed that their singing has similarly been shaped in Japanese musical style. Therefore, it may be quite conceivable that the development of young children's singing rhythm, and their rhythm in speaking, may have some influence on each other.

Further details of the language and musical development in infancy were studied by researchers in both the fields of language development and musical development (Papousek, M., 1996; Vihman, 1996; Jusczyk, 2003; Tafuri, 2002, 2008).

The figure below (figure 3.1) illustrates various developmental stages as reported in four different studies: precursors of singing in infants' preverbal vocal development (Papousek, M., 1996); pre-verbal language development (Vihman in Foster-Choen, 1999); infants' word recognition (Jusczyk, 2003); and the singing development of young children who were undertaking an intensive music training course with their parents (Tafuri et. al. 2002). The first study (Papusek, M. 1996) reviews the vocal skills and sound recognition of babies from pre-birth to 18 months old as displayed in chronological order from top-down.

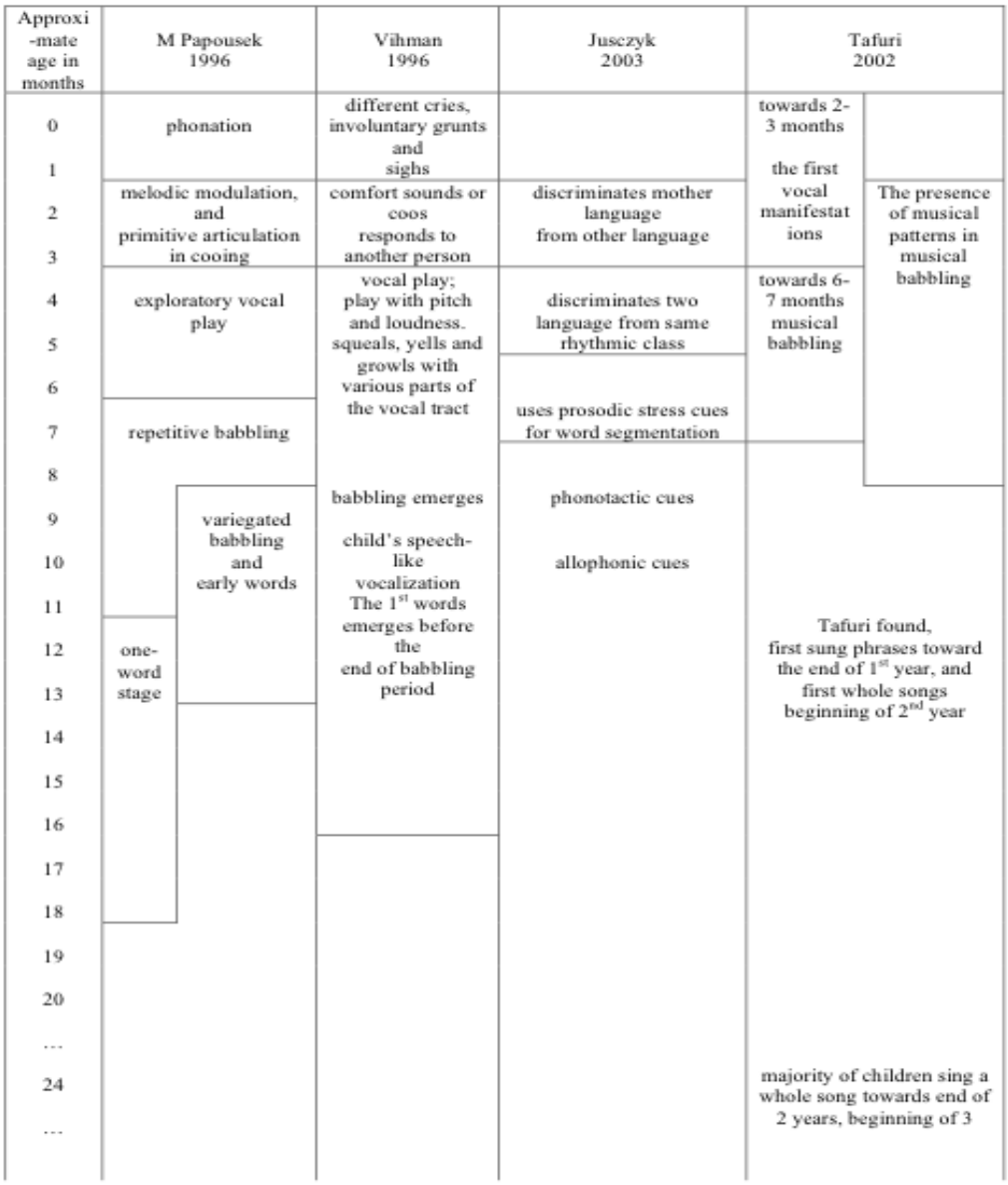


Figure 3.1 Developmental chart of vocal development and vocal sound recognition from key literature sources

3.2.1 Precursors of singing in infants' preverbal vocal development and pre-verbal language development

According to Papusek (M; 1996) there are six stages of vocal production in an infant's preverbal vocal development. There are phonation (0-1 months), melodic modulation and primitive articulation in cooing (2-3 months), exploratory vocal play (4-6 months), repetitive babbling (7-11 months), variegated babbling and early words (9-13 months), and the one-word stage (12-18 months). These six stages of vocal production development are nearly equivalent to the developmental stages of child language acquisition indentified by Vihman (1996, in Foster-Cohen, 1999). From birth to the first couple of months, the child makes different cries, involuntary grunts and sighs to express frustration, pain, anger and other basic body states. The child from two to four months makes comfort sounds or coos, and responds to another person. Four to seven months is seen as the stage of vocal play; children play with pitch and loudness, resulting in squeals, yells and growls using various parts of the vocal tract, characteristic 'raspberries', murmurs and snorts. Following the vocal play stage, when babbling emerges, the child's vocalization is more speech-like in sound. First words emerge before the end of the babble period. Babbling, in 11-16 month olds, seems to be independent of any particular language (Vihman, 1996). Foster-Cohen (1999) also reports that infant speech perception is just the same as in the adult, but sometimes the infant's perception is better than an adult for certain sounds, such as /ɛ~/ and / œ~/ in French (it might be the same /r/ and /l/ in Japanese).

The events in language development of Japanese infants, according to Masataka (in Sankeishinbun, 2003), are summarised as follows: cooing till 3 months old, laughter as vocalization practice, then the babbling and uttering become closer to resembling the Japanese fifty basic syllable sounds from 9 months old, with the child

starting to try to mimic words, then starting reproduction of words by 1 year old. Masataka also noted that the perception of words by 9 months old was consistent with Jusczyk's study (2003).

3.2.2 Infants' word recognition

Jusczyk (2003) reported the stages of an infant's language perception development as follows: infants discriminate mother language from other languages by 2-3 months old; discriminate two languages from the same rhythmic class (3-5 months old); use prosodic stress cues for word segmentation (5-7 months old); use phonotactic cues from 8 months old; and use allophonic cues from 10.5 months old.

Infants have an ability to discriminate language according to the rhythmic classification of their native language. Nazzi and Jusczy (1999) summarized past studies to show that newborns and 2-month-old infants are sensitive to rhythmic information. Infants do not recognize their native language as such, but rather their native language rhythmic class. The researchers used the traditional classification of languages based on their underlying rhythm: (1) syllable-based class: Catalan, French, Italian, Portuguese and Spanish, (2) stress-based class: Dutch, English and Russian, (3) mora-based class: Japanese. They undertook experiments with 5-month-old American infants to discover their ability in language discrimination from the same language rhythmic class, by using a head-turn procedure. The discrimination between English - Japanese languages (experiment 1), English - Dutch languages (experiment 2), and Italian - Spanish languages (experiment 3) were examined. The results showed significant differences between familiar and new languages in experiments 1 and 2, but no difference in 3. They concluded from the results that 5-month-old infants were able to discriminate their

native language rhythmic class, and also their native language from the same rhythmic class language group. It could be said that familiarization with their mother language rhythm (as a type of culturally derived rhythm), is already taking some shape by two months old.

The apparent consistency between the vocal production development (Papousek, M), language development (Vihman), and perception (Jusczyk) is notable, even though the foci of the studies were different, comparing musical vocal skills and language skills through observations of infants' vocal sounds. The vocal sound is not intended as music or a word by the infant, but sometimes may be interpreted as music or a word by adults. There is a consistency between infants' vocal production and word perception. Infants at 2-3 months can produce melodic modulation and primitive articulation in cooing, whilst they can also discriminate their mother language from other languages. Infants from 4 months old engage in exploratory vocal play while they are able to discriminate two languages from the same rhythmic class. The repetitive babbling stage is nearly the same as the stage of word recognition, which uses prosodic stress cues for word segmentation. These studies imply that the development in word recognition and vocal production interact with each other. Moreover, they suggest a link between language rhythm and infants' vocal production.

3.2.3 Developmental process of singing and environmental influence in infancy

To summarize the findings of musical development from past studies, the chronological order of the events appears to be as follows: an initial presence of prenatal and post-

natal responses to musical stimuli (Shetler, 1989; Woodward, 1992; Lecanuet, 1996; Tafuri, 2008), the role of musical stimulation is signalled in the first month of life (Fessbender, 1996; Papousek, H., 1996, Papousek, M., 1996), the first vocal manifestations can appear towards 2-3 months (Papousek, M., 1996), musical babbling appears towards 6-7 months (Moog, 1976), then invented and imitated songs appears towards 3-4 years (Davidson, 1994). Infant babbling and motherese are seen to be the first processes in learning to sing which have their origins in auditory perception prenatally, then right at the moment of birth, continuing the process towards 3-4 years, until the infants are able to make singing sounds in the same form in the maternal culture.

Tafuri and Villa's research (2008) revealed that intensive musical training of both parent and infant (including the time from pre-birth) is effective in enabling young children to gain musical skills earlier (younger) than the reported ages from other researches. At 2-8 months the infants showed attention to music that was introduced when they were crying or restless. They also preferred listening to their mother's singing than recorded music pieces. Furthermore, the amount of vocalizations were found to be higher than other documented research on infants. The presence of musical patterns belonging to the Western musical system was revealed in their musical babbling. The Italian researchers also found that the first sung phrases appeared toward the end of the first year, and for some children, the first whole songs appeared in the beginning of the second year. The majority of children were able to sing a whole song towards the end of second year and at the beginning of the third. The study findings appear to demonstrate the strong influence of the parent's culture, as well as their strong commitment to the children's musical development.

Rhythm seems to be the first element to emerge in children's singing development, though there is still some confusion regarding the rhythmic aspect of children's musical acquisition. Previous researches have sought to answer the question: 'Is the rhythm the first thing to emerge in children's' singing acquisition?' Umemoto and Iwabuki (1999) reported that rhythm is the primary factor for children when they are composing. Hargreaves (1986) stated that rhythmic skills are the first to emerge and develop, but also noted that rhythmic performance tasks improved at the age of 8-9 years. However, Schuter-Dyson and Gabriel reported some different opinions from older researches (1981). They reviewed researches made on young children's ability with tap-in-time and tapping-rhythm tasks (e. g. Thackray, 1972; Petzold, 1966; and others), and noted the lower percentage of success in these tasks for younger age children. On the other hand, Schuter-Dyson and Gabriel also reported Rinbow and Owen's (1979) and Frega's (1979) studies, which suggested that including speech rhythm is easier for 3-year-old children, and speaking the rhythmic pattern before clapping, helped to produce success in a rhythm task.

Moog (1976) also reported the results from six tests with 3-month-old to 5-year-old children, stating that babies select the quality of a sound as the criterion for attention and prefer smooth treble-register pitched sounds. His test 3, which was designed for rhythm-centered behaviour, attracted hardly any attention from the children, even though it was much louder than any other test. From this, he concluded that babies show hardly any overt behavior which could be called musical, up to the age of six months (concerning rhythm-centered sound stimuli). In other words, to attract an infant's musical interest, pitch comes first, and rhythm follows later. The musical growth of the infant emerges first in relation to pitch, not to rhythm. However, specifically for singing development, Moog reported that words and rhythm (rather than

pitch and melody), are first to emerge in singing development. He summarized the process thus:

> Most children begin, sometime between the age of one and two, by imitation of words. Then a little later they begin to add the rhythm. Finally they reach the stage of imitation the pitch as well. (p. 97)

He also reported that at the age of two to three, the number of children who could manage to sing whole songs increases noticeably, and at the age of three to four, 76% of children were more or less able to sing correctly. From his study, it can be summarized that children's musical perception and reaction to musical stimuli begin with pitch in the first year of life, but when they start singing at the age of two to three, the musical utterance starts with words containing some rhythmic structure, with pitch and melody coming later. Considering the likely ability of young children' singing and rhythmic behaviour, the targeted age in the present doctoral study must be older than 3 years old.

3.3 Singing in musical development and influence of environment, society, culture and language

In this section, I present a literature overview of material concerning the development stages of young children's singing, especially pre-school, and those who have reached school age and are supposed to have started singing whole songs. This developmental

stage would apply to the outer layers, especially concerning ‘generative musical skill development’ and ‘schooling’ layers, of Welch’s Russian dolls model of musical development theory (2006).

The age at which children become able to sing whole songs and start going to nursery or kindergarten, is about the same in Japan as it is in the UK. When children start attending nursery, the former boundary of the carer-child environment now broadens to include influences from the outside world. The child’s first step in social experience begins at nursery or school. The musical development of singing in nursery/school children, which was found in research literatures, is the focus for this section.

The development of young children’s singing behaviour has been reported in several studies (Moog, 1976; Sloboda, 1985; Welch, 1997, 2005; Hargreaves, 1986; Slade, 1989; Papousek & Papousek, 1981). From these studies, it could be concluded that young children are usually able to sing at the age of two to three.

Hargreaves (1986, p.61) characterized the development of young children’s ‘milestones of musical development’ as follows;

age 0 - 1	Reacts to sounds
age 1 - 2	Spontaneous music making
age 2 - 3	Begins to reproduce phrases of songs heard
age 3 - 4	Conceives general plan of a melody; absolute pitch may develop if learns an instrument

age 4 - 5	Can discriminate register of pitches; can tap back simple rhythms
age 5 - 6	Understands louder/softer; can discriminate ‘same’ from ‘different’ in easy tonal or rhythm pattern
age 6 - 7	Improved singing in tune; tonal music perceived better than atonal
age 7 - 8	Appreciates consonance vs. dissonance
age 8 - 9	Rhythmic performance tasks improved
age 9 - 10	Rhythmic perception improves; melodic memory improves; two-part melodies perceived; sense of cadence
age 10 - 11	Harmonic sense becoming established, Some appreciation for finer points of music
age 12 - 17	Increase in appreciation, cognitively and in emotional response

(Hargreaves, 1986, P 61).

Table 3.1 phases of a children’s musical development according to Hargreaves (1986, p.61)

Hargreaves also agrees that young children begin to reproduce phrases of songs heard at the age of 2-3.

Davidson et. al. (1997) illustrated the early life span of musical development and confirmed the mean ages of musical behaviour as they first occur in early childhood. They obtained reliable data from past studies by Manturzewska in 1990, and Sloboda and Howe in 1990, Sosniak in 1985 and 1990. By adding their own data (Howe et. al. in

1995) to that obtained in past studies, they confirmed that the five different study groups did not vary greatly. The early stages of development were described as follows: mean ages of these activities starting being:

(1) 1.40 years for the infant moving to music;

(2) 1.94 years for the child showing a liking for musical sounds;

(3) 2.31 years for being attentive to music;

(4) 4.43 years for requests to become involved in musical activities.

(Davidson et. al., 1997, p. 192)

They noted that only in early singing was there a significant difference between the groups, with the children now attending a specialist music school being reported as singing on average six months earlier than all the other children, at a mean age of 1.70 years. They concluded that the reason why singing occurred earlier in the specialist group may be that these children's parents engaged in more musical activities with their children than the other parents.

If parents/caregivers are more engaged in singing, their children tend to start singing earlier than the average (Tafuri & Villa, 2002; Slade, 1989; Davidson et. al., 1997). Tafuri reported the first sung phrases appeared towards the end of the first year. Slade's study (1989) of children aged 21, 27, 30 and 46 months, who had received prenatal musical stimuli, reported that the children had a greater ability to sing in-tune and play percussion instruments. While some 4-year old children can sing perfectly in

tune, generally the percentage is relatively low at 5 years (Welch, 1997). In Davidson et. al.'s study (1997), the mean age of the children's musical accomplishments was observed to similarly correspond to that reported above, but the musical production itself did not take into account any differences in specific rhythmic behaviour.

Another study, which is notable in the field of language acquisition, is Grabe et. al.'s study (1999) on the acquisition of rhythmic patterns in English and French. They examined the rhythmic patterns which were produced by 4-year-old French and English children and their mothers. The PVI[9] analysis of the rhythmic patterns showed that 4-year-old French children appear to have acquired the syllable-timed rhythm of French, while 4-year-old English children had not yet acquired the stress-timed rhythm of English. The differences in language development were reported between the two languages, but there is no such equivalent research on musical development.

The cultural influence on young children's singing behaviour has been studied more in relation to melody than rhythm (Chen-Haftek, 1999; Mang, 2003, 2006). Acccording to Sloboda (1985), it is reported that 5-month-old infants are already sensitive to sequential structure (reporting Chang & Trehub, 1977a, 1977b). These infants perceived a six-note atonal melody (Chang & Trehub, 1977a) and were also sensitive to changes in rhythmic patterns (Chang & Trehub, 1977b, and additionaly in Trehub 2006). It could be concluded from these studies, alongside others in this literature review that musical enculturation starts at a very early stage in young children's development.

[9] PVI – see chapter two for a definition

3.4 Language and Music development policy in Education in Japan

The importance of language and music for young children's development is commonly accepted among parents, caregivers, educators, and the government of Japan. Language and music are treated as two independent subjects in schools from elementary to high school level. However, music is not treated as an independent educational goal in the current course of study for Kindergarten [幼稚園教育要領; *Youchien Kyouiku Yoryo*]. Nevertheless, the national guideline for early childhood care [保育要領："*Hoikuyoryo* (former regulation of the national curriculum standard for kindergarten, enacted in 1948)] had two contents which related to music; such as "content 2 rhythm" and "content 5 music". Rhythm has featured only as a very basic musical activity for young children. "Rhythm" was treated as one of the study goals (or rather contents of childcare at nurseries) in the first version of the Course of study for Kindergarten "*Hoikuyoryo* [保育要領 (the national guideline for early childhood care) enacted in 1948]" after the World War II (Tamiaki, 2008). *Hoikuyoryo* was revised and changed its name several times. Now there are two guidelines from two ministries in Japan. One is *Hoikusyo Hoikushishinn* [保育所保育指針] published by Ministry of Healthcare, Labour and Welfere, and the other one is *Youchien Kyouiku Yoryo* [幼稚園教育要領 Course of study for Kindergarten] which is published by the Ministry of Education, Culture, Sports, Science and Technology, MEXT. The current education standards for kindergarten and guidelines for nursery are based on the original *Hoikuyoryo*. In the *Hoikuyoryo*, contents are listed as 1 exploring 見学, 2 rhythm リズム, 3 resting 休息, 4 free play 自由遊び, 5 music 音楽, 6 story お話, 7 drawing 絵画, 8 production 製作, 9 nature observation 自然観察. Interestingly, "Rhythm" was treated separately from

"Music" in the contents of childcare in *Hoikuyoryo*. This was because rhythmical activity is considered as important for young children's development. One of the goals of this activity is making children satisfied with doing music activities and with expressing feelings individually and as a group member. The examples of "Rhythm" activities are listed as *Shoka*-play: singing, dancing, and playing with *Shoka* to learn play games with rules; and also to develop their spontaneous improvisations in making lyrics and songs, rhythm-play: physical activity with rhythmic movement. Mimicking things around them with rhythmic movement, imitating such things as animals, trains, cars, the actions of working people, snow, rain, wind, flowers, leaves and so on. Music in use for the "Rhythm" activities is noted that it must be simple and beautiful.

"Music" in *Hoikuyoryo* (the national guideline for early childhood care) was meant to be Western style music. It is consists of three categories such as (1) singing, (2) instrumental, and (3) listening/music appreciation. Song materials were noted that they must be beautiful, bright (in major scales), simple, and not using a wide range of pitch. Major scales and simple beats such as 2/4 or 4/4 were preferred. It is written that dotted note rhythm must be avoided, though there are many songs with this rhythm existing in Japanese children's songs. Instruments were mainly percussion, such as drums, snare drum, cymbal, triangle, recorder, harmonica, and xylophones. In the last section, 40 music tunes were listed as music acquisition materials. In both "Rhythm" and "Music" sections, the importance of children's autonomy was mentioned repeatedly.

In my experience, *warabeuta* first emerge as children's spontaneous playing with singing, (therefore rhythmical play), but they are not mentioned in the first *Hoikuyoryo*. *Shoka* was noted as "Rhythm" activity. From this, it can be interpreted that *warabeuta* were not considered relevant materials for either music or rhythmic activities in schools, kindergartens or nurseries in 1948. *Shoka* was ordered by the government for

school music materials. It can be assumed that *warabeuta* were sung as part of "free-play" in nurseries and kindergartens at that time, though they are not mentioned in *Hoikuyoryo*. In the "Story" section of *Hoikuyoryo*, the importance of stories for children and control of vocal expression were written. The word "rhythm" was not found in this story section. It means that the rhythm of language was not considered as current language (English) education.

Although music performs a large role in kindergarten activities, and the time which children spend on music is quite long in nursery, music is not set as one of the five educational goals in the current national curriculum standard for kindergartens such as health [健康], relationships [人間関係], environment [環境], language [言語], expression [表現] (retrieved from the Ministry of education, culture, sports, science and technology, Japan, http://www.mext.go.jp/b_menu/shuppan/sonota/990301a.htm, on 5 March 2008). In kindergarten, the national curriculum sets language [言葉] as one of the five educational goals, but music is treated as part of another goal related to 'Expression' [表現]. The educational goal 'Expression' consists of two areas, which are music and art. In the latest Japanese national curriculum standard for kindergarten [幼稚園教育要領], which was published in 2002, the target stated is that "children will be able to enjoy singing songs and playing simple rhythms with percussion instruments". Therefore, associated musical skills (e.g. singing and performance of at least one accompaniment instrument) are required behaviours (knowledge, skills, understanding) for kindergarten teachers. One other educational goal in the kindergarten curriculum is 'Language' [言葉]. Children are meant to learn how to express their thoughts and feelings with their own words, and to develop their ability to listen to other people's talk. Although these goals were written separately, the learning process of music and language are often

considered to be the same by Japanese musicians and educators (Saito, 1999; Shibata, 1983; Suzuki, 1985). For example, the Suzuki Method is based on the idea that "all children can be well educated" and "if children have the skill to acquire their mother tongue, then they have the necessary ability to become proficient on a musical instrument" (retrieved from http://suzukimethod.or.jp/02/idea.html on 5 March 2008). Suzuki Shinichi's theory was clearly explained in his book "*Yoji no sainou kyouiku* 幼児の才能教育" (1969).

Hideo Saito, the founder of a private music college Toho-gakuen, also said that the way of learning music is the same as learning a language. If this is the case, the learning subcomponent of musical expression, which is not necessarily written on the musical score, requires some patience and is like learning intonation and/or accent of each word in a foreign language (Saito, 1999). Saito (op, cit) stated that a Japanese student learning Western classical music is like a student learning a foreign language. Music and learning a language and are closely related to the mother culture.

In the kindergarten and school curricula in Japan, singing and speaking are separated as school subjects, as in "ongaku [音楽; music]" and "kokugo [国語; Japanese language/literature]". Singing and speaking have been considered as very close historically (see 3. 2. 3. in this chapter). Therefore, some educators started pointing out the necessity to break through the boundary between music and language/literature in school subjects (Uchida 2008; Saito, 2001; Yoneyama, 1998). Those who claim the importance of linking language and music education suggest that they are bringing to education a traditional method of learning. The 'old' method reported to be the recitation of sentences or, sometimes, whole stories from old literature. They also claim that reading aloud has a good effect on physical growth, and

mental development. Yasuda, the author of a book [*身体能力を高める和の所作*; Improve physical performance by Japanese gestures (2010)] also reported positive effects of Noh style singing lessons work on children's development (Yasuda, 2010). Yasuda is a Noh player and also a trainer of Rolfing® (a system of Structural Integration soft tissue manipulation). In his Noh lessons and workshop, children are trained to recite a long story in traditional vocal singing/chanting style. They memorize the whole story by ear, not from text. The sitting position for reciting [正座; Seiza-style, sitting on the floor with folded legs underneath tight and a straightened back] is not familiar to contemporary children. The children who struggle to maintain this sitting style are also reported to be unable to produce a loud enough voice. However, after a few months of lessons, most children are able to sit in Seiza-style, and can produce a good enough voice for reciting. Meantime, their behaviour in schools and home was also reported to have become calmer.

Other initiatives linking language and music in education are hoped to emerge from current reforms in the National Curriculum for kindergarten, elementary, junior high, and high schools, which came into force in April 2011. In this reform, English was to become a compulsory subject in elementary school, and educators, teachers and parents were urged to prepare children to learn English outside schools before its formal enforcement.

In Japanese children's English conversation schools (such as Yamaha English school, ECC junior, AEONKIDS and others), activities for children often involve games and the chanting of words or short sentences, which are commonly accompanied by music. These English schools have established their own methods for teaching younger children, attempting to make learning English a fun activity. They have also

focused on developing children's native-like English pronunciation and fluent speaking skills. Speaking English fluently with proper pronunciation is a high expectation of most Japanese parents. Singing songs in English and chanting words with a musical rhythm is considered by most English teachers and parents to be the best and most fun way for children to learn the language.

On the other hand, some educators and the Japanese Ministry of Education have emphasized the importance of children learning their mother language (Toyokanshuppansya, 2008; Ministry of Education, 2008). The time for "Kokugo [国語; Japanese language/literature]" classes was increased in the latest national standard for school education. In other school subjects, students expressing thought in Japanese writing and speaking was emphasized as an important goal of study. For example, in music class, students were asked to express their feelings and thoughts verbally or in writing after they listening to music.

NHK (Nippon Hoso Kyokai: Japan Broadcasting Corporation) started broadcasting "Nihongo de asobo [にほんごであそぼ; playing with Japanese language]" which was a Japanese language-focused TV programme for young children in 2003. This TV programme takes the same theoretical position as "Eigo de asobo [えいごであそぼ playing with English language] which started in 1990. In the programme famous Japanese traditional performers, such as Kabuki actors, Kyogen players, Rakugo players, and Joruri players played with old Japanese texts, music and children. Some of the texts were performed in a traditional style and others were played with contemporary music. The CDs and DVDs produced from this TV programme were very popular amongst children and parents. The programme itself was once awarded Guddo-dezain-sho (The good design award) in 2004, which is given by the Japan

Industrial Design Promotion Organization. A boy, whom I met in Sakurai kindergarten in 2003 during the first fieldwork of this doctoral study, loved this TV programme and repeatedly listened to the CD at home. He was one of the best singers in my fieldwork study and quite often improvised songs for me. In his improvising sessions, he got inspiration from seeing something and picking a word associated with it. Then he would start improvising a song with the word. From his case example, it would seem to be a very effective way to link language and music with the development of young children's expressive musical ability. However, using Japanese language was once claimed as not suitable for young children's music education, especially for their musical rhythm education (Kuniyasu, 1979). In her book on rhythm education, she reviewed several music education methods, such as Orff, the Kodaly system, Dalcroze eurhythmics, rhythm education in America, and this led her to organize her own rhythm teaching method. In the last chapter, she also stated her vision of rhythm, education and the cultural circumstances in Japan. In this chapter, she explained the mora-timed rhythmic character of Japanese language. She concluded that the mora-timed language of Japanese was not suitable to use in learning proper rhythms in Western music, because there is no strong-weak accented rhythm in the Japanese language rhythm.

In the history of music education in Japan, *warabeuta* (children's songs) were once encouraged for their potential to establish a music education method. Research into young children's music education practice has been undertaken in Japan for a long time, ever since Western style music was first introduced to the country and the government decided to take Western style music as a school subject "Shoka" (the modern style school system [学制; gakusei] was first introduced in 1872). The researches were designed to improve children's musical abilities in Western style music, which used to be unfamiliar to them. Some foreign music education methods were

introduced to Japan, such as Orff, Kodaly and Dalcroze eurhythmics. Some music education theories/systems were invented by Japanese groups, such as the Suzuki method, Yamaha music schools, and Kawai music schools. Some educators tried to establish their own music education theory/system using *warebeuta*. This movement was influenced by Kodaly's music theory (Akiyama, 2008; Honma, 1982). According to Honma (1982), the movement to position *warabeuta* as the main foundation of music education happened in 1960 among the members of the Japan Teachers Union. They thought: "Music education in Japan since the Meiji era was too unbalanced, Western music centered. The Western style music had brought some good outcomes, but *warabeuta* must be positioned as the starting point of Japanese music education. Japanese language makes Japanese people. There is provision of the way to feel sounds in *warabeuta* which children sing and play." (Honma, op.cit. p.87). However, this movement did not last long. In 1964, the main members left the Japan Teachers Union; then this movement vanished. Meanwhile, there were other people who were studying the use of *warabeuta* for young children's education. The music section of the Tokyo Hoikumondai Kenkyukai (Study group of problems of nursery children in Tokyo) sought to use *warabeuta* for children to develop their ability of good behavior in group activities (Honma, 1982). In fact, *warabeuta* have been and still are used for activities in young children's physical education. The nature of *warabeuta* as a genre of children's play/game song seems to fit social education. However, in this case, music itself and language are not the prime foci as goals of young children's education. To summarize, *warabeuta* are generally considered now as not suitable for learning Western style music, because the *warabeuta* reflect Japanese language rhythm, which is very different from Western language and music. There are huge gaps between Japanese and Western (English/German) language rhythms, and also Japanese and Western music.

Therefore, as mentioned above it has been suggested in the past that the Japanese language was not suitable for developing a Western sense of musical rhythm, such as by Kuniyasu (1979). However, this way of thinking may be irrelevant in this century, as most Japanese people arguably have become musically over-Westernized. However, there arguably must be something still remaining of "Japanese-ness" in both children's actual singing, and in published songs which are composed in the Japanese language.

3. 5 Issues arising

As noted previously in this chapter (see 3. 2. 3), music and language are reported to be closely linked in young children's developmental stages. Musical factors related to infants' vocal sound-experience development have been noted and studied in several researches in the field of young children's education, development, and psychology (e.g. Shimura, 1996; Papousek, M., 1996 ; Vihman, 1996; Jusczyk, 2003; Tafuri, 2002). These studies were undertaken with very young children, especially noting those who are not yet able to sing whole songs. There are some studies which have tried to show the effectiveness of music for young children's language development (e.g. Slade, 1999; Washizu, 1997). There are also studies of young children's singing behaviours (e.g. Welch, 2005; Hargreaves, 1986; Moog, 1976; Umemoto & Iwabuki, 1990; Mang, 2002; Barret, 2001). However, there has been very little research into young children's singing in terms of the influence of the mother language's rhythm, and the rhythms which belong to the culture (Umemoto et. al., 1999).

The possible influence of mother tongue on musical perception (Iversen et. al., 2008; Deutsh 2004) and production has been revealed in recent studies (Patel & Daniele, 2003; Patel et. al., 2006; Ohgushi, 2003, 2006; Iversen, 2004; Sadakata, 2003, 2006), but all the studies were undertaken by investigating the music productions of adults. It is possible to think that the link between singing and speech maintains a certain degree of influence on adults' musical performance. In terms of rhythm, Minami's study (2000) examines the underlying rhythmic behaviour of children's play songs, though it was observed in adult participants' reproductions. It may be that the musical rhythm of children's play songs lays a foundation of rhythmic schemata for the acquisition of musical rhythm in subsequent learning in further (formal) education. However, the influence of mother tongue on young children's singing behaviour has not been researched yet. The goal of this doctoral study, therefore, is to explore a theory of the link that might connect adults' musical performances and children's musical development in terms of cultural influence, especially in the links between singing and speaking.

3.6 Summary

All Japanese children are educated with Western classical music at school from the age of six to fifteen. Music outside school is also mostly played on Western instruments, and composed in a Western style. The Japanese government added "traditional music" as a compulsory learning material in a previous version of the National Curriculum (1998), after they noted the lack of traditional Japanese music in Japanese life and

education, which had led to a perceived loss of "Japanese-ness" in music. However, "Japanese-ness" is still found in J-pop and other contemporary music, especially in the musical expressions of performers (Denda, 2006; Ishii, 2007; Mori, 2004). Different rhythmic characteristics in musical performances have been reportedly found in the musical behaviours of Japanese people (Ohgushi, 2003; Sadakata, 2005). These findings suggested that a reason for this remaining "Japanese-ness" in Japanese popular music and other music performances could be considered as related to the mother tongue rhythm. The rhythmic schema of language is formed in the early stages of children's development. Before babies become able to produce any words, they demonstrate an ability to be able to distinguish languages by the rhythmic group (Jusczyk, 2003). By the time young children become able to speak their mother tongue, they have formed the schema of the language rhythm, though it is still does not sound as adult-like rhythm. The acquisition process of rhythm patterns in the mother tongue was found to be different in different languages (Grabe, et. al., 1999). It was found that French-speaking children's speech developed earlier, acquiring the features of their mother's speaking rhythm, faster than their English equivalents. However, the musical rhythm of young children's singing has not yet been studied to ascertain the influence of mother tongue. Therefore, in this study, an analysis of young children's singing is the focus of my investigation, and the aim is to establish the degree of influence by the mother tongue on young children's musical development. An analysis of young children's actual singing is one way to delineate the developmental phases through which one gains one's own cultural musical expression. Printed music of English and Japanese children's songs are also analyzed to compare to examples of children's actual singing rhythm, and for making further comparisons between the different rhythms used by two different cultures (Japanese and English). These are reported later in the thesis.

Chapter 4 Methodology

4.1 General approach (methodology): The analysis of rhythm in vocalization

The position of this research in terms of an epistemological stance is unique, because it consists of three different types of studies on one theme: the effect of mother tongue on young children's musical development in rhythm. Using a mixed method via three different studies could provide stronger evidence to establish the theory.

The three studies were carried out on (1) children's singing rhythm, (2) children's printed songs, and (3) adult's recognition and representation of children's song rhythm. The first study on children's singing rhythm was designed to capture their development in actual rhythmic timing in singing. The nPVI measurement used in psychological studies was applied for the analysis. The second study on children's printed songs was aimed at revealing the character of rhythm in children's songs. The children had been surrounded by and affected by singing and listening to these children's songs. A quantitative music analysis was carried out to seek the influence of the songs on the children. The third study was on adults' recognition and representation of children's song rhythm. Another quantitative music analysis was carried out on their performance timing to see the effect of mother tongues on rhythm performance timing and the effect of children's songs on their development.

There were two research questions, 'How much influence is there between patterns in a culture's *language* rhythm and the same culture's patterns of *musical* rhythm?'; and 'How and when do children gain their cultural musical expression?' (see page 32 of this thesis). To seek the answer to these questions, three studies were planned. The first and the second studies were especially designed to find the answers

of the first question: the relationship between language and musical rhythm by comparing two language groups (Japanese and English). The third study also supported the effect of mother tongue on musical rhythm. To the second question, the first study could show the results of 'when' do children gain their cultural musical expression, and the second study was able to show 'how'. The third study supported to find 'how' on the same question by adding detail of Japanese people's recognition of singing rhythm.

The researcher's role in this study was that of observer in the first and the third study; although the researcher had to arrange the situation so as to record the performances, without showing her performance in front of the participants to avoid influencing the results.

4.1.1 Exploratory

In this study, the main focus is a rhythmic analysis of young children's actual singing timing. To clarify the process of how children form fundamental musical rhythm schemata, it was necessary to investigate actual singing behaviour. The analytical method was derived from language acquisition studies. There are three reasons. First, both singing and speaking are vocalic activities. They require breathing and motor control of muscles for vocalization. The movements of the muscles are developed by speaking in everyday life, and trained to produce the language's underling rhythmic style. Therefore, the rhythm in children's speaking may also relate to musical behaviour, as was found in other studies with adults (Patel, et. al, 2003; Iversen et.al, 2004). It is hypothesised that because singing involves lyrics as sung text, there is likely to be some effect of language on young children's musical rhythm development.

Secondly, the developmental process of language acquisition is considered to be closely linked with the developmental process of singing. Music and language are

often closely linked, at least in young children's musical development during the first years of life (Papousek, 1996; Malloch, 1999; Welch, 2005). Children aged between three to five years are often observed singing and playing with words in music-like form(ulae) (Mang, 2003). Singing is the major musical activity for young children. Therefore, it could be said, that through their singing, children form a rhythmic schema of their culture's music style.

Thirdly, a prosody level analysis of young children's singing has not been undertaken in past studies. Singing is a fundamental musical activity for young children and producing 'musical' vocalic sounds could be regarded among the first stages of learning musical behaviour. The very first emergence of their cultural background in musical rhythm could be in their singing, though this has not been the subject of rhythmic analysis research so far.

Other analyses were made subsequently as part of the research fieldwork. These embraced analyses of printed music from children's songs, and the rhythmic behaviour of university students. In the second analysis, which was made on children's music scores, nPVI and IOI (Inter-Onset Interval) were applied to search for music style and form in an aspect of rhythm. nPVI were used in order to link analysis to former studies connecting language rhythm and rhythm in music, and IOI for 2:1 and/or 3:1 dotted rhythms. Children's songs reflect the music of their culture, and especially language. Just as Patel's studies demonstrated that language rhythm is reflected in music scores, the rhythm of a mother tongue may be found in children's songs.

In the last fieldwork phase, the rhythmic behaviour of university students, as acquired from childhood song-play was analysed. The students were asked to clap some specially selected *warabeuta* songs from memory. Usually, people acquire knowledge of *warabeuta* songs in their childhood while playing games accompanied by songs, not

from music scores. Thus the rhythm of *warabeuta* can shape people's rhythmic behaviour at a young age. Consequently, by analysis it could be demonstrated that a link exists between adult music behaviour and young children's singing.

Two categories for musical rhythm analysis

Most of the studies in music rhythm can be categorized into two types according to the targeted materials of the analysis. One is a rhythmic analysis of the musical score and the other is on the exact timing of the musical performance (see the table 4. 1. below). Many studies have been undertaken using musical score analysis, mainly in the fields of ethno-musicology and music education. For example, most of the *warabeuta* analysis studies have used music notation in a Western style music score, based on recordings of children's singing and an analysis of the music from the emergent score (e.g. Koizumi, 1984; Kojima, 1999; Iwai, 1998). Washizu (1997), for example, compared Japanese and English children's songs. My previous studies (Azechi, 1998, 2001) on the evolution of rhythmic patterns in Japanese popular music were also undertaken by the analysis of transcriptions of the sung products. Researches into Japanese literature and the aesthetics of Japanese poem rhythms also sometimes use a Western music score application for their analysis (Nakayama, 2001; Sugaya, 1975). However, the studies mentioned above tended to be focused on one culture only and we cannot apply this analysis method easily for comparative study, because comparison may not be equivalent in two different cultures unless the music is identical. As an alternative, Patel and Daniele (2003) applied nPVI analyses (see Chapter 2) to compare music in two different cultures which was defined by the mother tongue languages of the composers.

Meanwhile, researchers in the field of music psychology have focused on cross-cultural study by analyzing music through an exact timing of performances (Hannon & Trehub 2005; Ohgushi, 2002; Sadakata, 2005).

As indicated in Table 4. 1, the approach in this doctoral research is to apply nPVI analyses to both examples of the music score and also in an exact timing measure of children's singing in order to see if there is a link between both categories. This is one way to connect an adult's idea of the music rhythm model for the child and the reality of children's singing. The music score is written by adults and it is designed to fit into an idea of Western music style. In contrast, children's actual singing timing should show the reality of their singing rhythm, which is still subject to developmental processes towards the formation of a particular cultural music style. In addition to the analysis above, the IOIs of dotted rhythms in chidlren's actual singing and universty student's hand-clapping in *warabeuta* songs, were analyzed (Table 4. 1.).

Music score analysis	Performance timing analysis
Analysis on music style or musical form	Analysis of musical expression (possible to compare individual difference within same music)
Past nPVI study	
French vs English compositions (Patel & Daniele, 2002)	Rhythmic production by Japanese vs Dutch percussionist s(Sadakata, 2005)
In this study	

nPVI analysis on published music score of - children's songs in Japan and - children's songs in England (chapter 7)	nPVI analysis on recorded children's singing of - "Twinkle, Twinkle", and - dotted rhythm in "If You're Happy and You Know It" (chapter 5 and 6) IOI analysis on recorded children's singing of - dotted rhythm in "If You're Happy and You Know It" (chapter 6) IOI analyis on university students hand clapping of warabeuta songs - dotted rhythm in "Antagata Dokosa" and "Zui Zui Zukkorobashi" (chapter 8)

Table 4.1 Two approaches to musical rhythm analysis

4.1.2 Cross-cultural aspects

First of all, care must be taken with the 'cultural twist' of music circumstances in Japan. Japanese children are learning Western music at schools and most of the songs that they experience, including even *warabeuta*, are played on Western musical instruments and written in Western style music scores. It is a foreign music for Japanese children, though people nowadays do not necessarily think about the origin of the music that they

hear in schools and daily life. They may even hear Japanese traditional music as very 'exotic' or a genre containing unfamiliar sounds.

Because the dominant music style is foreign (in the sense of being non-native), the language of any musical lyrics is sometimes not related to the natural language rhythm of Japanese. On the other hand, English children grow up with a music style arguably more naturally connected to their own native language rhythm. So, there is no 'cultural twist' when English children sing English language nursery rhymes and children's songs. Therefore, it can be hypothesized that the experience of singing common songs might be different for the children of the two language groups in terms of a psychological task, no matter whether they are aware of this or not.

Language rhythm and music

The first reason for choosing Japanese and English as the two language groups for this study is that these languages are very different in their underlying spoken rhythm (Chapter 2). It may be, therefore, that the two languages are also different in their sung rhythm if the underlying prosodic bias in speech has an impact on singing. A musical nPVI approach has been used to show the difference between stress-timed and syllable-timed language in music (Patel & Daniele 2003), so the same tendency might be expected between children's singing and published music scores.

Table 4. 2 illustrates the expected rhyhmic character of children's singing if this follows the rhythm of their mother tongue in speech. It is hypothesised that the native language rhythm is likely to have some influence on their singing, although it is recognized that Japanese children are enculturated into a Westernized musical environment and education. This hypothesis was strengthened from a visit to a kindergarten in Japan in September 2003 to undertake a pilot study.

Japanese	English
Flat pitch Non-accented Equal-timed	Unevenness in pitch Strong-weak accented Short-long

Table 4.2 Expectation of rhythmic characters in children's singing based on speech characteristics

Before I went into the playground, I had an opportunity to chat with a few nursery teachers. When I asked them about the students' favourite songs, especially their favourite *warabeuta* (Japanese children's play songs), they said that children nowadays did not know *warabeuta* unless they had been especially taught them. Teachers said that they preferred to use "new songs" rather than *warabeuta*. They said it was rare to hear children in the school singing *warabeuta*. The reasons they gave related to the very large music media aimed at young children in Japan. A massive amount of CDs, music books, videos and DVDs are released every year targeted at children (Nenkan, 2003; 2004; 2005), and media songs are usually written in a Western musical style. Nevertheless, the first time I went into the kindergarten playground, the children chanted at me in excitement at seeing a new adult stranger. The chanting was a repetition of the word "jiji-baba" (爺婆), meaning old man and hag. It was not very polite, but there is a genre of *warabeuta* called "*hayashiuta*" or "*karakaiuta*" meaning jeer song or teasing song, which became my nickname afterwards for a short time. The

word jiji-baba popped out because of my appearance. I was in a masculine-type outfit, blue jeans and dark colour outdoor jacket, and perhaps most impressively, I am very tall as a Japanese woman. My height is more than 20 centimeter higher than the average. So, I perhaps looked like a monstrous man with a female face to their eyes. The chanting was in a very basic *warabeuta* style, with a two-tone melody and dotted rhythm in two-beat meter. This chanting occurred very naturally and began spontaneously from one child, then quickly spread amongst a group of children; the melody and rhythm kept changing slightly, and were performed with small variations. Without formal learning of *warabeuta*, the children had evidently gained the skill of improvising in a *warabeuta* style.

4.1.3 Empirically-based

Recording the singing behaviours in a natural environment for the children, not in a laboratory setting, was chosen for this fieldwork. At one point, a laboratory setting for recording was considered, as this would have made the recording analysis-friendly, i.e. more easy to be computerized from the sound source. But even in a laboratory setting, there are unofficial reports passed among researchers that babies' and children's behaviours in general may be very different from that found outside. Responses can reflect the weather, the mood of the participants, and other unknown factors. Educators and nursery teachers told me that any child cannot reproduce singing in exactly the same rhythm each time. They keep changing, easily get excited or bored, and their singing is different each time. Teachers warned me about the different behaviour likely in a laboratory setting. Young children would need to be trained to be able to sing solo in front of the recording equipment. In such a case, it is difficult to control the training

in two different countries, and it might make the focus of the study blur. Therefore, recording in a natural setting was chosen for this study, to seek to understand children's rhythmic behaviour in natural singing. Recording in a natural setting in this instance meant to carry out recording in nursery classrooms and playground. It recognized that this sometimes reflected a difference of educational environment in classroom and playground. Although these differences in examples from the two cultures are reflected in the recording quality, they can be included as part of the cultural difference of children's musical environment in the two countries.

4.1.4 Ecologically sensitive recording; Japan in-playground, England in-school (open plan context)

The chaotic, and therefore confused, sound environment in Japan is well described in the film "*Touch of the Sound*" (2004). Too much of a chaotic sound environment in public places for Eveline Glenny (a professional percussionist who has hearing problems, and the main person in the film) made her uneasy and feel insecure. Music was played aloud in public places uncontrolled and, even worse, with noise related congestion from the amount of people sometimes as well. A good example is a shopping mall. The mall itself plays background music all day, and each shop in the mall plays their own music. The singing-like call of barkers selling and the ring tones of mobile phones make the sound situation even more complicated. As a result, there is musical 'congestion' everywhere. This sound phenomenon is evidenced in many kindergartens and nurseries as well. Lots of music is played through loud speakers, to promote a daily routine, and to keep up the time-schedule. The time-schedule music was played even while as observed, in one classroom, children were doing their musical

activities. Children had to shout over these sounds. In some kindergarten, singing turned into blaring out or shouting (Yoneyama, 1998). Incidentally, this became a big problem for my fieldwork recordings in Japanese kindergarten. This is perhaps why there have been suggestions of a need to teach children to have greater control of their singing and speaking voices (Yoneyama, 1998; Yasuda, 2010; Saito, 2001).

4.2 Method (specific details)

4.2.1 Selection of locations

Fieldwork recordings were undertaken in a kindergarten in Japan and a nursery school in England. Finding a kindergarten in Japan was initially a difficult task. Schools and kindergartens in Japan have been closed to the public since a terrible incident happened in 2001, when the Osaka school massacre happened. To get into a school, even for research study, it was necessary to be introduced first by somebody who knew both the teachers, especially the headmaster/mistress, and me. Therefore, the initial trial to find a cooperative kindergarten failed. Consequently, I sent letters to kindergartens in Okazaki (my hometown) and made phone calls to introduce myself, to explain the research and to get permission to get into a school. When I introduced myself, and my study background, especially as a student belonging to a foreign university, it made teachers wary. When I started to explain my research, they claimed bad experiences that they had had with other researchers and university students in the past. It would seem that researchers from a university and classroom teachers are estranged. Plus, there was another 'psychological' gap evident amongst teachers between those who were two-year-course junior college graduates and four-year-course university graduates. Junior

college graduates regard experience as the most important thing and claim that university graduates are too much knowledge centered. Therefore, there is a sense that the latter do not know the children as well. One of the headmistresses said “Give birth yourself, then you will see and understand”. This was when I first saw her and had not yet started introducing myself.

I also asked my former supervisors in my first university to introduce me to nurseries and kindergartens, but that route did not bring any positive result either. Eventually, I found a kindergarden willing to be cooperative in my study. It was Sakurai kindergarten (安城学園愛知学泉大学付属桜井幼稚園) in Anjo city, where I used to be a student. None of the current teachers knew me, but they found my name from an old album of graduates. Consequently, I went to the Sakurai kindergarten for a 4 weeks period across 2003, 2004 and 2006. During these weeks I visited the kindergarten everyday.

Compared to Japan, it was much easier to find a cooperative nursery in the UK. I was introduced to Old Oak Primary School’s nursery by my doctoral supervisor. I could get into the classroom easily, and spend time with children. I went to school for two days a week from September 2004 to March 2005. Children aged 3 and 4 years old of the nursery, and children aged 5 years old from the reception class of the primary school were cooporated as participants of this study.

Problems concerning the difference between the two recording settings; free in Japan and fixed in the UK setting

Recording sessions were undertaken in the Japanese kindergarten and the English nursery; in Japan: Sakurai Kindergarten (Data collection November 2004, and February 2006) and in the UK: Old Oak School Nursery (Data collection October 2004 to March

2005). The recording environments in these two schools were very diferent. Children were asked to sing songs including common nursery songs that existed in both cultures (Japanese children singing in Japanese, English children in English).

Recording environment in Japan

Recording in Japan was undertaken at the very end of a nursery day, while children were waiting for the school bus or for their parent to fetch them to go home. Most of children spent time waiting in the playground on sunny days, and in classrooms on rainy days, after the nursery program had finished. There were nursery teachers and some parents playing together with children. The first bus departed at three thirty in the afternoon, and the last bus departed at four thirty. Approximately one hour of the play time provided a chance to make recordings of children's singing. Children looked very relaxed, and enjoyed the play time. I was regarded as one of the adults who were happy to sing together with the children. I was surrounded by some children who wanted to sing with me or sing for me. Therefore, in the these background of the recordings, there is a lot of additional noise, and some other children's singing voices can be heard. Some singing tasks were not completed or transformed into other songs or chatting, because it was not a formal situation for singing.

Recording environment in England

In Old Oak school nursery, recording sessions were held within the time children spent in the nursery. The recording session was held at the end of the day (approximately starting at 14.30 and ending at 15.00), before the final story telling session of the day. This recording session was regarded as one of the school class activities. A nursery teacher attended all the session, and she led the recording sessions. I also attended the

session as assistant teacher, making the recording, taking notes and sometimes encouraging children to sing.

4.2.2 Selection of participants

The participants were drawn from the same age group. In both coutries, 3 to 6 years old Japanese-speaking children and 3 to 6 English-speaking children were asked to sing nursery songs, including a few common songs that existed in both cultures (see below). The Japanese children sang in Japanese and English children sang in English.

Japanese-speaking children sung song materials with Japanese lyrics. The only exception was the "ABC" song. This song is sung in English lyrics commonly in Japan. In the "ABC" song, there are several versions of the song and some part of the lyrics, and singing in English seemed a little difficult for Japanese children of this age. Therefore, the recordings of this song were not included in the final analysis.

4.2.3 Protocols

Choice of song material

Song materials were as listed below (Table 4.3). Each comon song had the same melody line, but was sung in thr native language. Most of songs in the list above (Table 4.3) are commonly known and sung in both countries. Exceptions were "Darumasanga Koronda" in Japan and "Humpty, Dumpty" in the UK. "Darumasanga Koronda" is a children's traditional Japanese *warabeuta* game song. "Humpty, Dumpty" is a popular nursery rhyme in England. Sometimes, it is spoken as rhyme and sometimes it is sung. In England, a few different versions of song recordings exist.

JAPAN: Sakurai Kindergarten, 3-6yo Japanese speaking children
- Kirakiraboshi (Twinkle, Twinkle, Little Star) - Itomaki no uta (Wind a Bobbin Up) - Shiawasenara tewo tatako (If You're Happy and You Know It) - Abc - Darumasanga koronda
UK: Old Oak nursery, 3-6yo English speaking children
- Twinkle, Twinkle, Little Star - Wind a Bobbin Up - If You're Happy and You Know It - Abc - Humpty Dumpty (singing and story telling)

Table 4.3 Song materials for the recordings in each country

"Wind a Bobbin Up" ("Itomaki no uta" in Japan) started with a similar melody line, but the rhythm is different in the Japanese and English versions. The latter half of the song was completely different between the two countries. Therefore, this song was not included in the analysis. As a result, two common songs; "Twinkle, Twinkle" ("Kirakiraboshi" in Japanese) and "If You're Happy and You Know It" ("Shiawasenara tewo tatako" in Japanese) were chosen for nPVI analysis.

"Twinkle, Twinkle" ("Kirakiraboshi" in Japanese) was chosen as the sung material because it has exactly the same rhythm in Japanese as the English version in a

written music score (Figure 4. 1 and 4. 2). The expected nPVI values of this song, which were calculated from an analysis of the music score, was 22.22 in both language versions. The structure of this song is also suitable for nPVI analysis because each phrase is written in exactly the same rhythmic pattern and repeated five times.

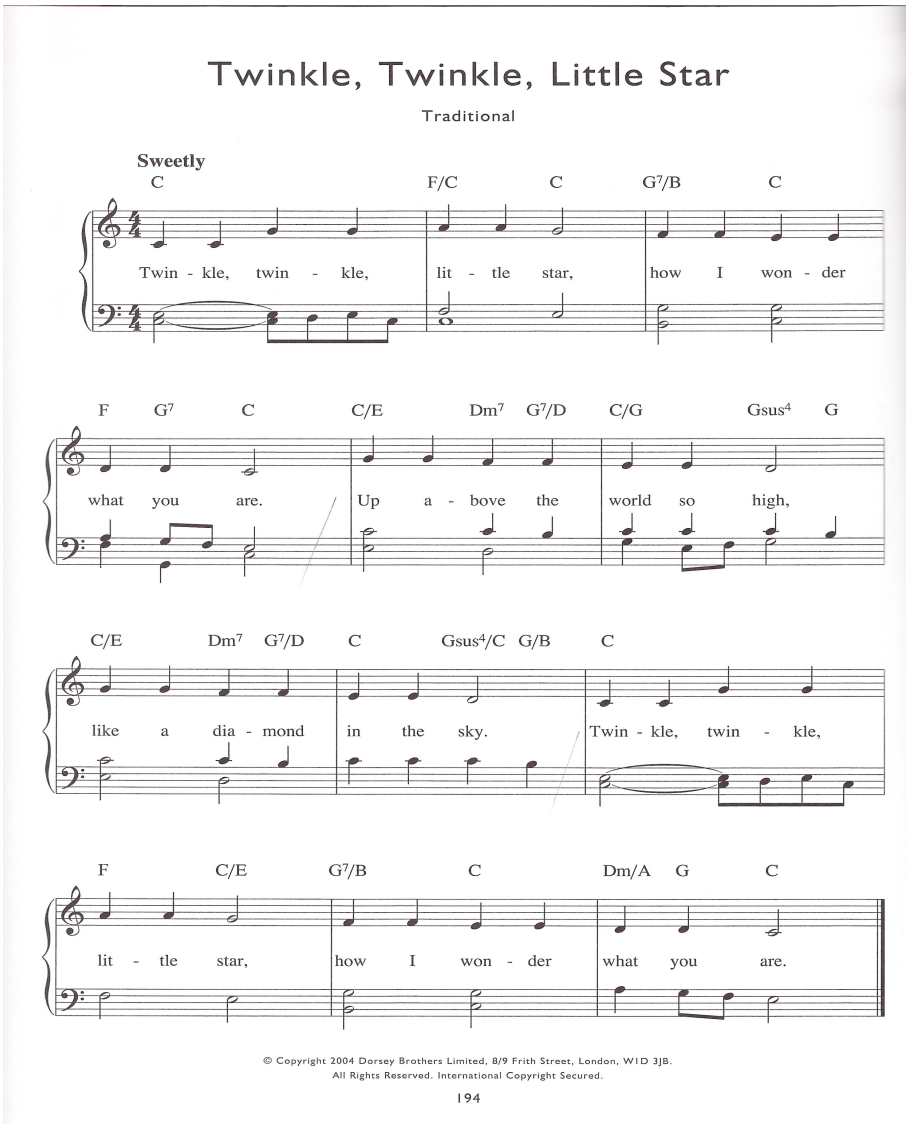


Figure 4.1 "Twinkle, Twinkle, Little Star" music score from "*The Big Book of Nursery Rhymes & Children's Songs*" (Amsco Publication, 2004)

There was background information provided in "*Our English Songs 1* (Teacher's Edition)" (1971 Nakajima, Fumio et. al. Eds. ELEC 財団法人英語教育協議会 Tokyo).

"Unlike an oral tradition children's song, this song's composer is clear. This song first appeared in "Rymes for the Nursery" (first published in 1806, and reprinted 27 times over 30 years) written by Ann and Jane Tylor, who were sisters. As is indicated in this book, Jane Taylor (1783-1824) was the composer of this song. Althoghu this song is now extremely well known, this famous song was eliminated from "The Puffin Book of Nursery Rhymes"（1963）edited by Mr. and Mrs. Opie. Presumably because it was seen as a modern creation.

This song is often made into parody, especially 'Twinkle, twinkle, little bat!/ How I wonder what you're at!/ Up above the world you fly/ Like a tea-tray in the sky' by Lewis Carroll (Alice in Wonderland) which was famous as a parody masterpiece."

(original text is in Japanese)

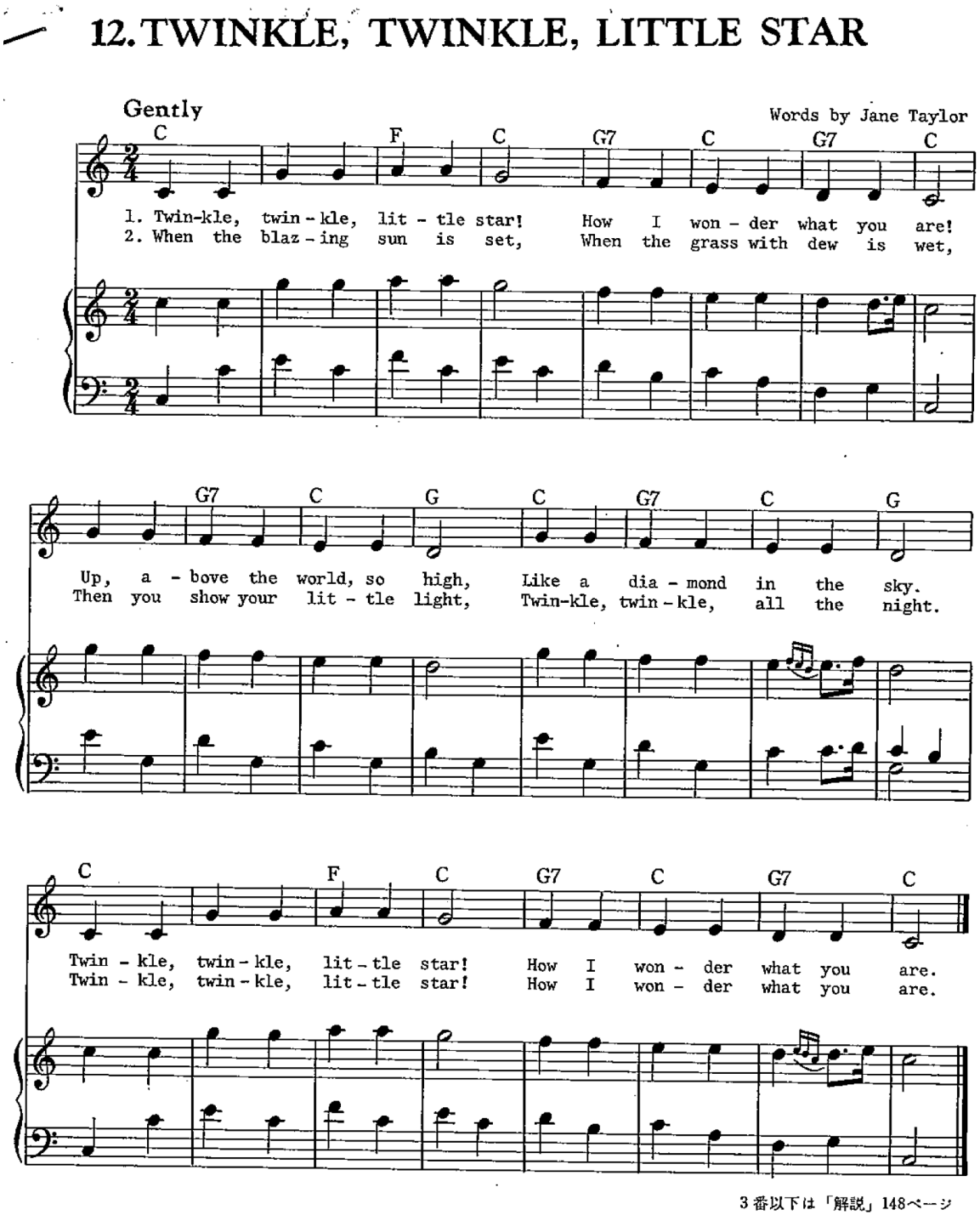


Figure 4.2 “Twinkle, Twinkle, Little Star” music score from “*Our English Songs 1* (Teacher’s Edition)”

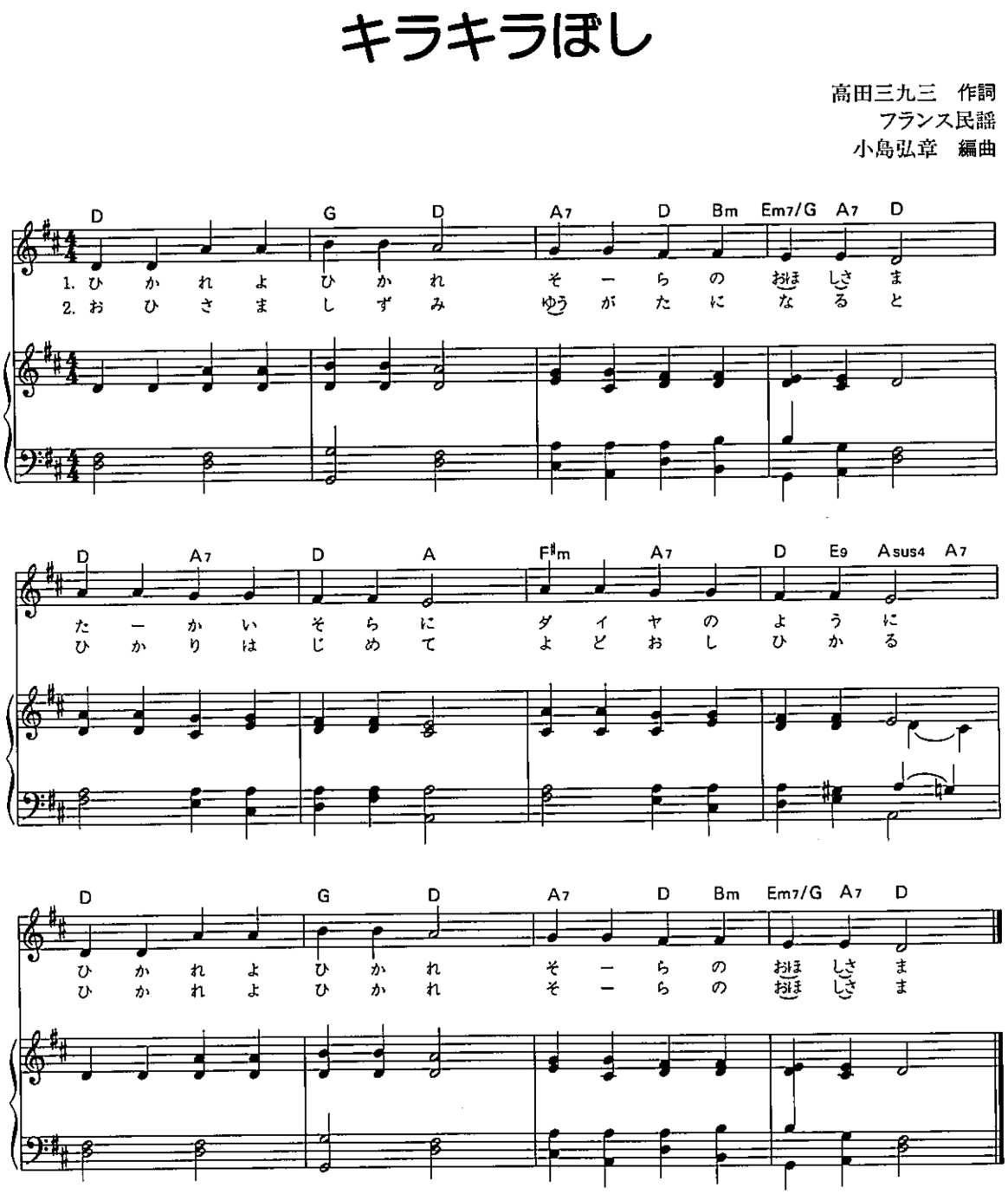


Figure 4.3 “Kirakira Boshi (Twinkle, Twinkle, Little Star)” music score from “*Zoku Kodomono Uta 200*” (Childsha, 1996)

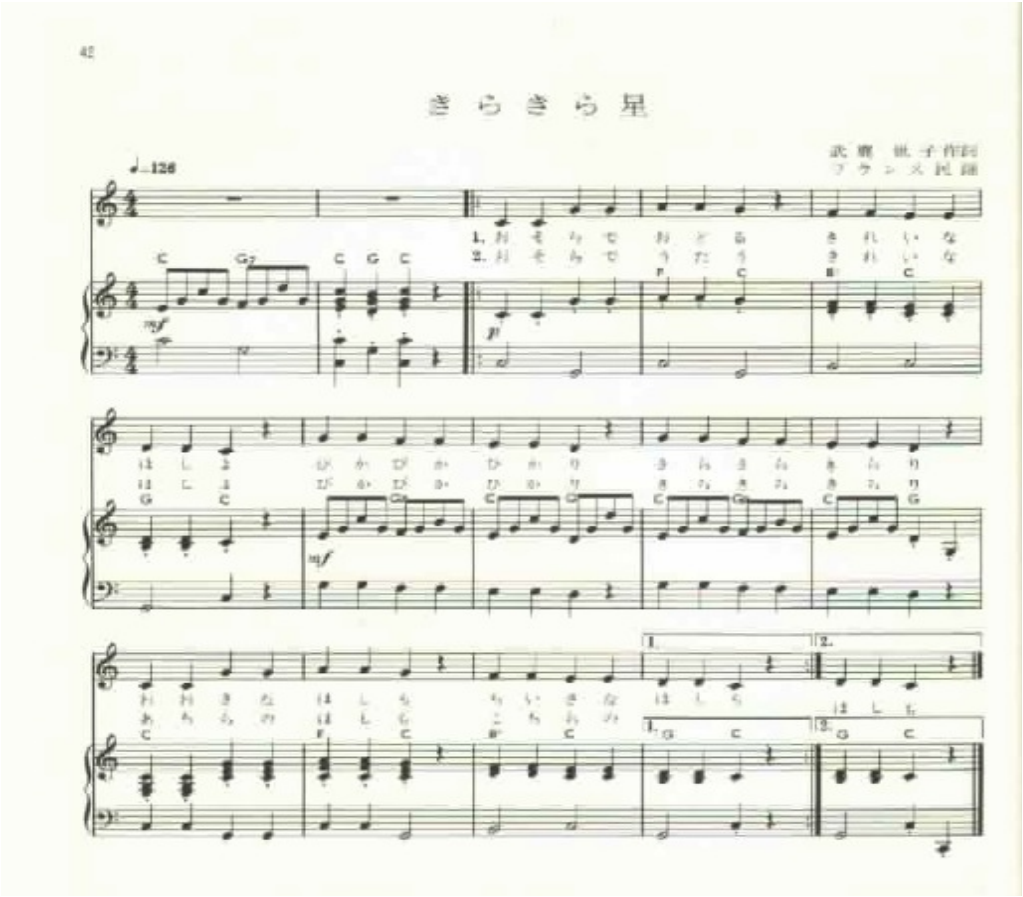


Figure 4.4 “Kirakira Boshi (Twinkle, Twinkle, Little Star)” music score from “*Youjino Utato Rhythm*” (Ongakunotomosha, 1984)

“If You’re Happy and You Know It” (“Shiawasenara tewo tatako” in Japanese) also has the same rhythm in both language versions, except at the end of the third phrase. Therefore, the expected nPVI values were slightly different between the Japanese and English versions (103.59 vs. 105.46). These two songs were ideal songs for comparison because of their internal design. “Twinkle, Twinkle” had successive eighth note rhythms, whereas “If You’re Happy” had dotted rhythms; one began on a downbeat and the other began on an upbeat. However, the latter song has several versions of writing style in published music score in English. Commonly in Japanese and in English the style of the notation is in dotted rhythm (see figure 4. 5 And figure 4. 6).

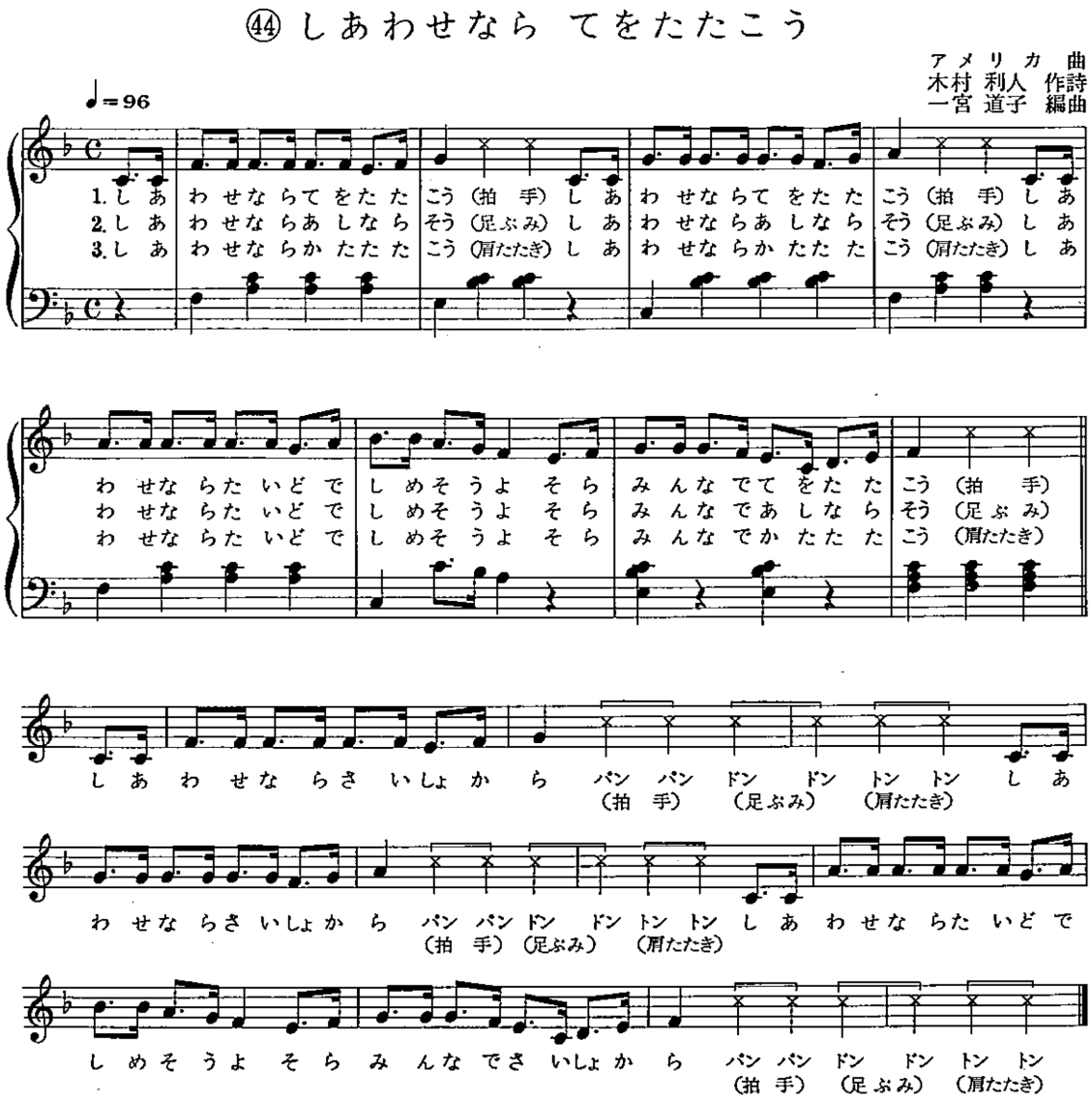


Figure 4.5 Japanese music score of 'If You're Happy And You Know It' from a songbook: "*Kodomonouta 200*" (Childsha, 1975)

Figure 4. 5 illustrates the Japanese version of the common song "If You're Happy and You Know It" and is written in a dotted rhythm, with a repetition of the pairs of a dotted eighth note followed by a sixteenth note.

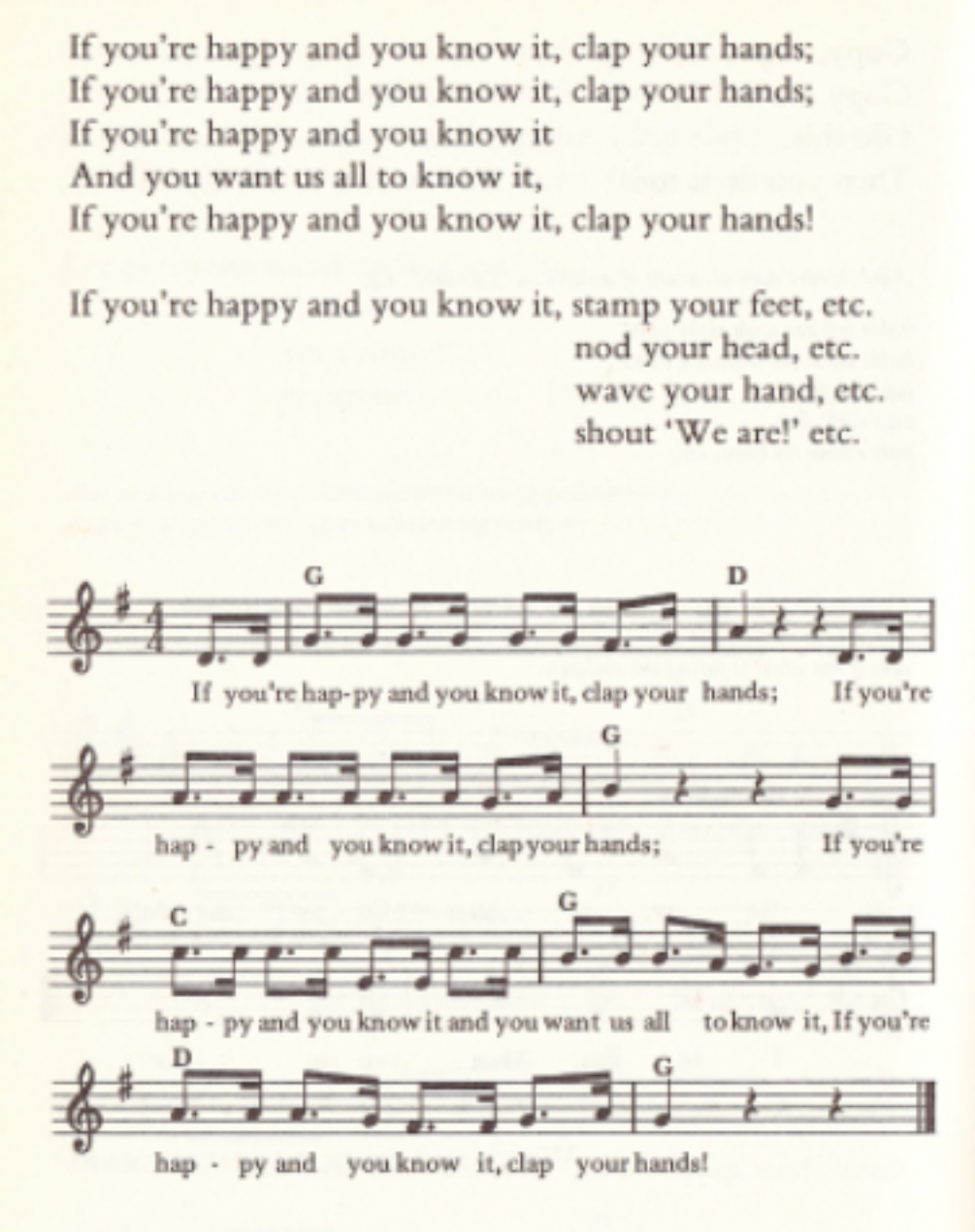


Figure 4.6 English music score of 'If You're Happy and You Know It' from a songbook: "*This Little Puffin*" (Penguin Books, 1969/1991)

In Figure 4. 6, the common song was written with exactly the same rhythm pattern as the Japanese version. However, in some music books, the song is written in a different way (see Figure 4. 7, for example).

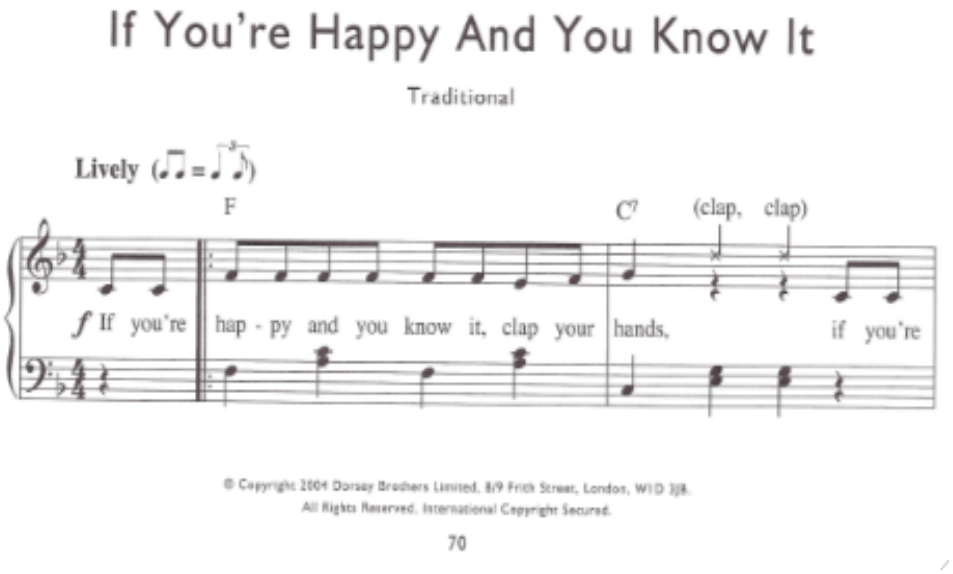


Figure 4.7 The beginning part of music score 'If You're Happy And You Know It' from a songbook: "*The Big Book of Nursery Rhymes & Children's Songs*" (Amsco, 2004)

In figure 4. 7, the song is written in equal-timed notes, successive eighth notes, with the indication of a "Swing" rhythm at the beginning of the score. In actual singing, this song has been repeatedly sung in a 2:1 ratio (triplet) rhythm. This commonly happens in Japanese *warabeuta* songs. Koizumi stated that 3:1 ratio dotted rhythm basically did not exist in *warabeuta* (Koizumi, 1984). The 3:1 ratio is turned into 2:1 ratio in singing, and this bouncing rhythm does not normally exist in *warabeuta,* nor in traditional Japanese music. An exception may be caused by actions or lyrics which have particular letters (e.g. ん、っ、ー; which easily become weakened morae). English versions of this song might be sung in a 2:1 ratio rhythm, not in 3:1. This may explain why several ways of music notation exist in published songbooks.

Expected nPVI values were calculated, therefore, in three different ratios; in 3:1 dotted rhythm, 2:1 bouncing/shuffle rhythm, and 1:1 equal-timed rhythm (Figure 4. 8)

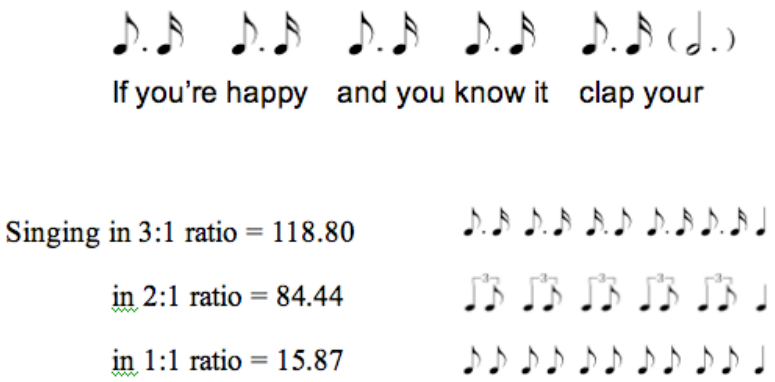


Figure 4.8 A phrase from the song "If You're Happy and You Know It", and its nPVI values calculated in possible ratios of the tone length, 3:1, 2:1 and 1:1

Expected nPVI values were calculated from music notations. They were 118.80 in 3:1 ratio dotted rhythm, 84.44 in 2:1 ratio bouncing/shuffle rhythm and 15.87 in 1:1 ratio equal timed rhythm. All the nPVI values in this study were slightly larger than the values which were calculated by a nPVI culculator on a website (Normalized Pairwise Variability Index, http://www.nsi.edu/~ani/npvi_calculator.html). This occurred because the nPVI value of this study was culculated by using an Excel sheet where formula was made by hand. The website did not exist when the author was carrying out this analysis. However, the ratio of the all values would not be changed with this Excel formula culculation. Therefore, the results of the data analysis would be appropriate for following analysis, results and considerations.

As a trial, I tried to encourage children to sing common songs in syllables. But this did not work effectively. Singing "la" was problematic for young children, as L

was difficult to pronounce. Every child hesitated to sing “ma” also, but “la” and “ta” were more successful for them. Singing “Twinkle, twinkle” in sol-fa seemed much easier for them, once they had become used to it.

Recording process

Japanese children aged 3yo to 6yo were asked to sing the focus songs in Japanese. The recording session was undertaken in Japan during, 2004 and 2006 at a private kindergarten. English children of the same age groups were asked to sing the same songs in English. The recording was made at a state school’s nursery in London during 2004 and 2005. The same recording equipment was used for all the recording sessions. Sound recording, used a Mini Disk recorder (SONY portable MiniDisk recorder MZ-N910) and a pin microphone (Audio-Techinica stereo microphone AT9901). Video recording was also made in Japan. This was not for the analysis itself, but to catch students’ names (children were in uniform with a name tag) and to follow the situation for each recordings. Therefore, in some cases, Japanese children put the pin microphone on their chest and sang in front of the video camera. In such cases, ethical permission had been granted in advance. This happened at their request. They enjoyed being filmed. Mini Disk (MD) recordings were converted to audio files (wav, 44.1 kHz, mono) using SoundStudio2. Then, selected examples (chosen for recording quality) were segmented into each tone/note by hand using WaveSurfer. The vowel-onset was chosen in this analysis to calculate rhythmic timing as the onset of interval duration following previous specialist research (Sundberg, 2004; Sundberg, 1989).

4.2.4 Analysis process

The participant Japanese and English children aged 3-6 vocal products for their singing of two songs “Twinkle, Twinkle” and “If You’re Happy and You Know It” were analyzed using nPVI (normalized Pairwise Variability Index). The nPVI values were generated from the rhythmic analyses from the actual length of IOIs (inter-onset intervals) in their sung products.

Selected examples (chosen for recording quality, i.e. with less background noise) were segmented into each tone/note by hand using *WaveSurfer* (see figure 4. 9 as an example).

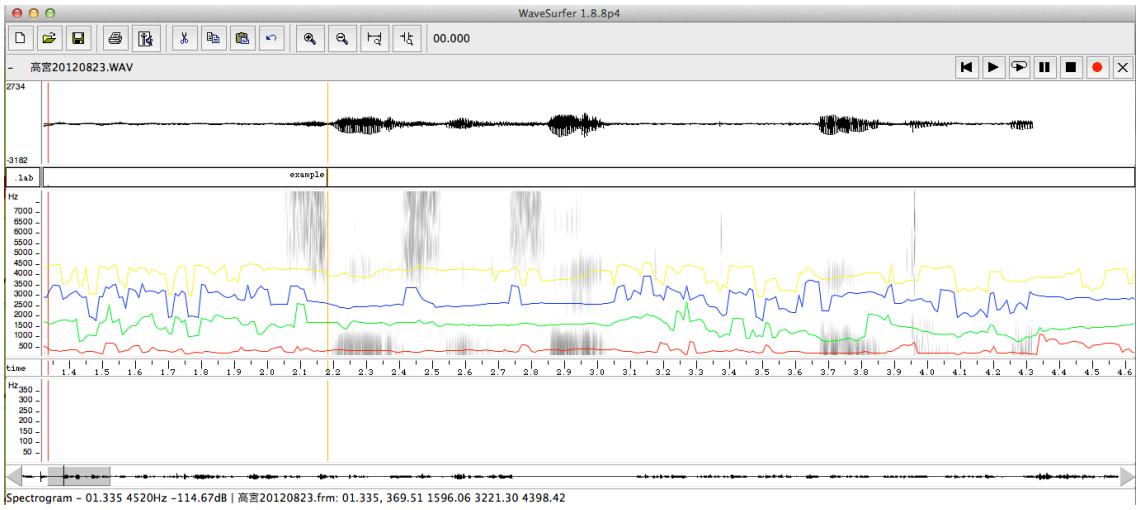


Figure 4.9 Example window of WaveSurfer spectrogram analysis

Segmentation for IOI (Inter-Onset Intervals)

Vowel-onset (Sundberg, 1989; 2004) was chosen as the onset of interval durations for children’s singing analysis.

H

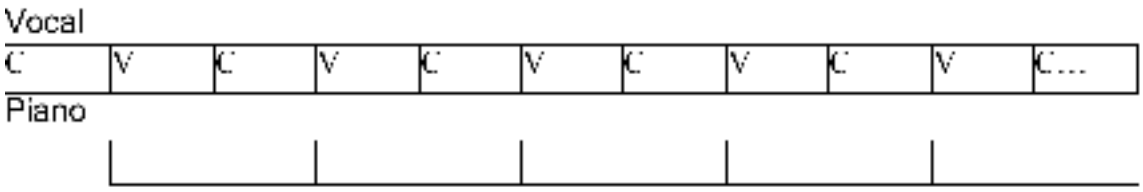


Figure 4.10 Vocal segmentation and timing of the beginning of piano notes for comparison

The starting points of vowels in vocal singing were matched with each begininng of the accompaniment piano tones in Sundberg's studies (Figure 4. 10). Therefore the starting timing of the musical note can be thought of as the beginning of vowels in sung performance.

A cultural issue emerged in discussion with Japanese research colleagues on the segmentation. They challenged the idea that a musical tone started on a vowel onset. Maybe it is because the writing-system of the Japanese language makes it difficult for people to think of each prosodic sound divided into consonants and vowels. "Is vowel-onset appropriate for Japanese or non-trained children's singing?" was the first reaction when they heard the protocol of segmentation of the vocal sounds. However, this was not an issue when listening to the actual Japanese recordings of its children's singing.

WaveSurfer was used for the selected examples (chosen for recording quality) to be segmented into each tone/note by hand, and to get the IOI of each tone.

4.3 Preliminary nPVI analysis

nPVI

In this study, nPVI was applied in the analysis of Japanese and English speaking children aged three, four and five. nPVI（normalized Pairwise Variability Index）was developed by linguists Grabe and Low (2002) for classification of underlying language rhythm (figure 4. 11).

$$nPVI = 100 \times \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| /(m-1) \right]$$

Figure 4.11 nPVI equation

nPVI is able to show the relationship between the language rhythm and music rhythm. Therefore, in this study, it might be expected that the Japanese speaking children group's nPVI value would be lower than for English speaking children because Japanese language is more even-timed in speech. Also, considering that young children's speech rhythm is gradually formed into their mother tongue language rhythm as part of normal development, any difference in the nPVI value may also get bigger, so the nPVI values of Japanese and English children would be greater for older children (e.g. 5yo) compared to those of a lower age (3yo and 4yo) groups.

Preliminary analysis was carried out on the two songs, "Twinkle, Twinkle Little Star", and "If You're Happy And You Know It". The preliminary analysis was to find out (1) whether nPVI categorizations were appropriate for applying actual length inter-onset-intervals [IOI] for analyzing children's singing rhythm (note: the previous studies used MIDI data or a music score for nPVI analysis, none used raw data except one, Sadakata 2005), and (2) to see whether recordings within a more naturalistic setting, not in a laboratory environment, worked sufficiently well for analysis.

In the first instance, twelve children's individual singing behaviours of a common song "Twinkle, Twinkle, Little Star" were analyzed. Singers were aged four and five (6 children each), in two language groups (English and Japanese, 6 children each). As far as was possible because of the recording environment (which meant that there was some background noise, or other children joining in), an nPVI value was calculated for each phrase of the song. The song consisted of five phrases and had exactly the same rhythmic structure. IOIs on vowel onset were used to analyze actual timing/rhythm of the participant children's singing.

The same procedure was carried out on "If You're Happy And You Know It" singing data. 12 children's singing, 6 Japanese (3x4yo and 3x5yo) and 6 English (3x4yo and 3x5yo) were applied for nPVI analysis. nPVI values were calculated per phrase. A total of 60 phrases (12 songs 5 phrases) were used for the preliminary analysis on "If You're Happy And You Know It".

From both preliminary analyses on "Twinkle, Twinkle Little Star" and "If You're Happy And You Know It", it was confirmed that (1) nPVI can be used for analysis when applied to the actual length IOI, for analyzing children's singing rhythm, and (2) recordings made in a natural setting, rather than in a laboratory environment, work sufficiently well enough for analysis. (The Japanese were confirmed in discussion with Professor Sundberg who was a visiting Professor at the Institute of Education at that time.)

4.4 Ethical issues

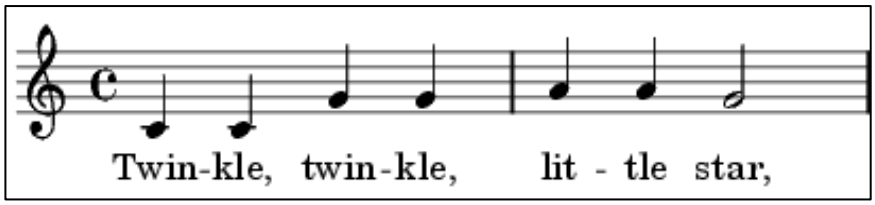
All children participated voluntarily at the invitation of their school head teachers and class teachers. The purpose of the research and recording was made explicit (in writing) and given in advance to all the teachers concerned. Written consent was granted by the school authorities. All personal data has been kept anonymous. The names of the schools are given with permission.

Chapter 5 Results from the Data analyses

5.1 Analysis on "Twinkle, Twinkle, Little Star": singing in a duple time rhythm

5.1.1 nPVI values by phrase

The nPVI value was calculated for each phrase from the fieldwork recordings of children's singing in the fieldwork. The singing that was chosen for this analysis was based on the state of the recording quality, and any error in singing, i.e., those songs which the children could complete without error in terms of rhythm, and without interruptions (such as noise and another child's voice), were chosen for the analysis. Therefore, in some cases, one or two phrase(s) were eliminated from the analysis of the whole song because of the background noise or other interruption. The basis for elimination was only considered in terms of rhythm; errors in pitch were ignored.



ki- ra- ki- ra hi- ka- ru

Figure 5.1 One phrase of "Twinkle, Twinkle, Little Star" with English (above) and Japanese lyrics

nPVI values for comparison to actual singing timing were calculated. The nPVI values, which were calculated from the length of the musical notes in published

scores, were 22.22 for one phrase (eg. Figure 5.1). This value equated to the nPVI value of a whole song because the rhythmic structure of six phrases in "Twinkle, Twinkle, Little Star" were exactly the same. The phrase consisted of six successive eighth notes followed by one quarter note. The lyric was sung in duple rhythm.

5.1.2 Analysis of Individual nPVI values on each singer

The total number of children for this analysis were n=20 Japanese (6 three year olds, 7 four year olds and 7 five year olds), and n=13 English (3 three year olds, 5 four year olds and 5 five year old) children.

The mean (average) nPVI value of each singer was calculated from the nPVI value per phrase. The table below (table 5.1) lists the average nPVI values of each participant singer.

nPVI	participants	Language	age	sex
45.84	1	Japanese	3	m
32.2	2	Japanese	3	m
36.31	3	Japanese	3	m
25.81	4	Japanese	3	m
28.87	5	Japanese	3	m
41.2	6	Japanese	3	m
22.65	7	Japanese	4	f
28.58	8	Japanese	4	f
30.17	9	Japanese	4	f
24.37	10	Japanese	4	f
21.77	11	Japanese	4	f
23.52	12	Japanese	4	f

21.77	13	Japanese	4	f
23.93	14	Japanese	5	f
23.41	15	Japanese	5	f
29.14	16	Japanese	5	f
29.65	17	Japanese	5	f
18.92	18	Japanese	5	m
26.6	19	Japanese	5	m
20.15	20	Japanese	5	m
28.49	21	English	3	f
29.95	22	English	3	m
26.71	23	English	3	f
32.89	24	English	4	m
26.06	25	English	4	f
27.5	26	English	4	m
24.87	27	English	4	f
23.73	28	English	4	m
30	29	English	5	m
31.7	30	English	5	m
23.97	31	English	5	m
41.91	32	English	5	f
27.76	33	English	5	f

Table 5.1 List of average nPVI scores for Japanese and English children for ‘Twinkle, Twinkle, Little Star’

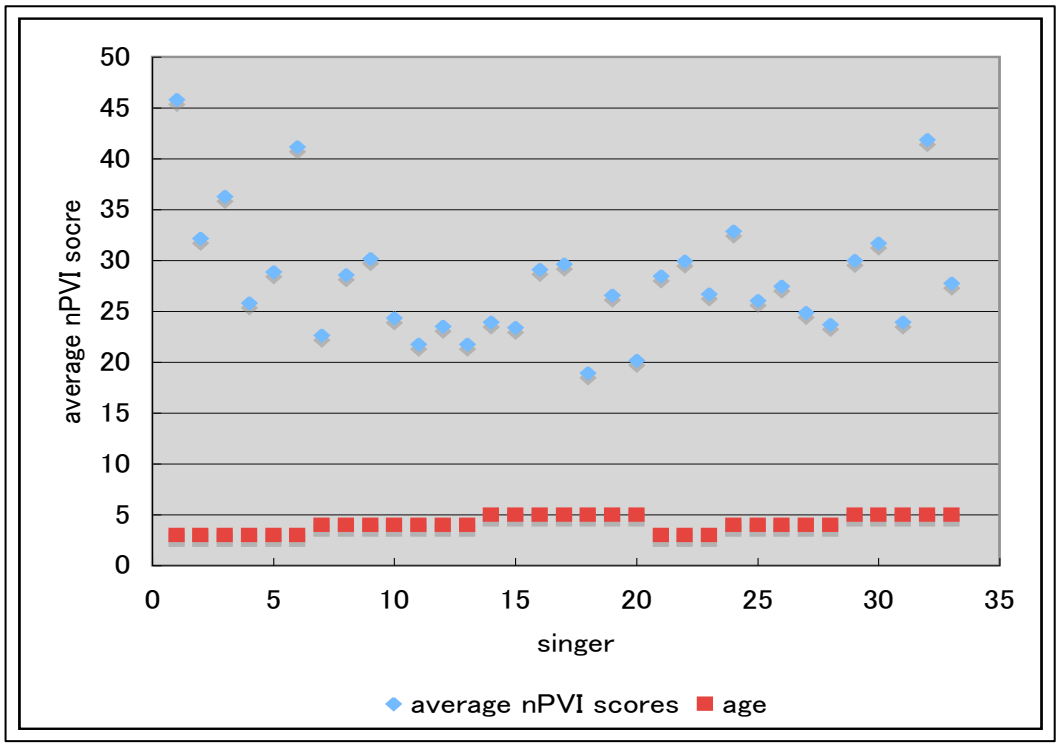


Figure 5.2 List of average nPVI scores for Japanese and English children for 'Twinkle, Twinkle, Little Star'

The figure above (5. 2) shows average nPVI scores for each singer singing "Twinkle, Twinkle, Little Star". Singers who were numbered 1 to 20 in table 5.1 were in the Japanese group, and 21 to 33 were English. An alternative data display (Figure 5. 3) shows boxplots for the two language groups. The median scores are similar for each, but with a slight bias towards a lower nPVI dispersion of data for Japanese children.

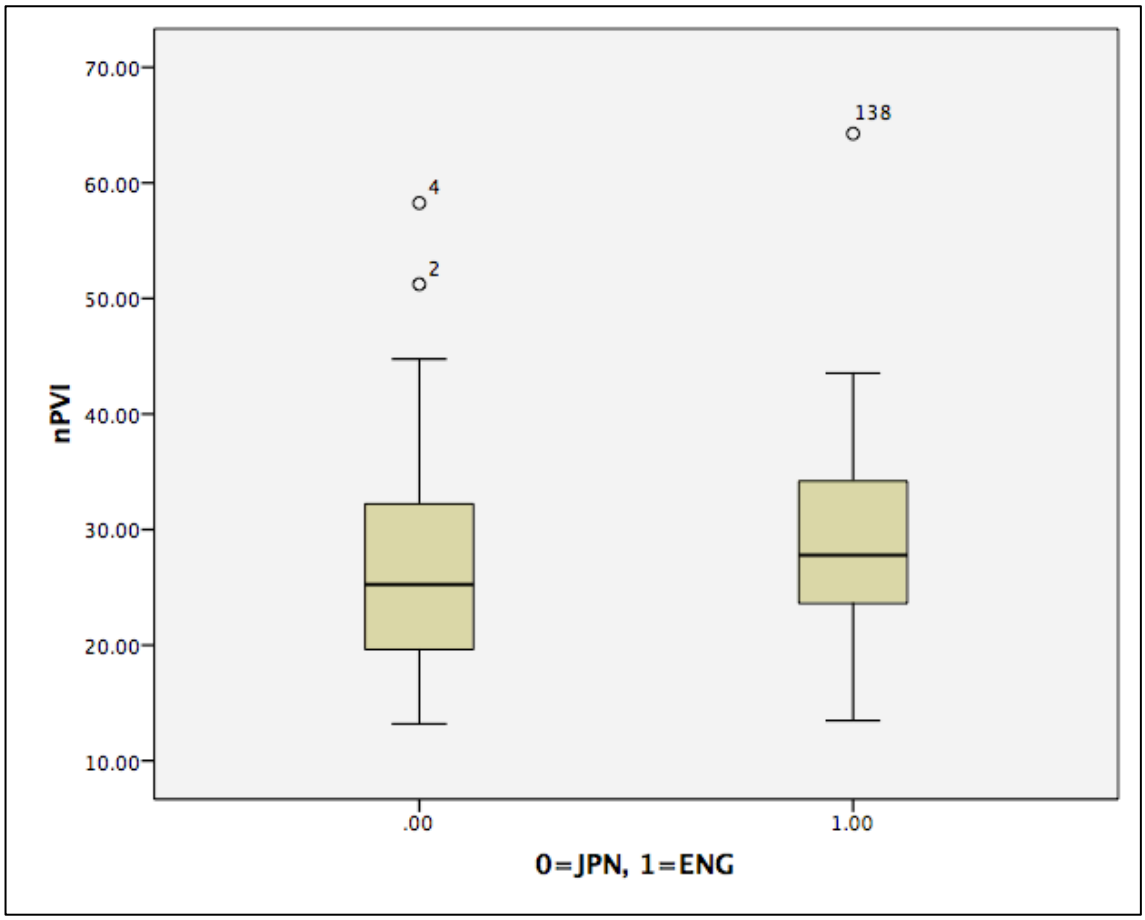


Figure 5.3 nPVI boxplots for “Twinkle, Twinkle”, Japanese vs English groups

Table of Analysis of Variance

source	SS	df	MS	F	p
A: language	11.0440485	1	11.0440485	0.439	0.5134
B: age	193.0696046	2	96.5348023	3.835	0.0342 *
AB	274.6900614	2	137.3450307	5.456	0.0102 *
error[WC]	679.7010122	27	25.1741116		

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001

Table 5.2 Results of Analysis of Variance

Two-way ANOVA results showed significant differences on the age factor, F (2, 27) = 3.835 (p<.05), and two factors (language, and age factors), F (2, 27) = 5.456

(p<.05). However, it was not significant between the two language factor, F (1, 27) = 0.439 (n.s.) (Table5.2).

pair	r	nominal level	t	p	sig.
1 - 2	3	0.0166667	2.649	0.0133234	s.
1 - 3	2	0.0333333	2.088	0.0463590	n.s.
3 - 2	2	0.0333333	0.606	0.5496237	n.s.

MSe=25.174112, df=27, significance level=0.050000

Table 5.3 Results of the Ryan's method: means of age factor

Table 5.3 shows a significant difference was found between age 3 and age 4 by Ryan's method on age factor, p = 0.013 (p<.05). By a simple main effect analysis of two factors; language and age, language effect on the age 3 group, F (1, 27) = 4.451 (p<.05), and on the age 5 group, F (1, 27) = 6.358 (p<.05) were significant. Also, age effect for the Japanese children group was found significant F (2, 27) = 8.434 (p<.005). Results of Ryan's method on the language factor showed that there were significant differences between age 3 and age 5 groups, p = 0.0002150 (p<.05), and between age 3 and age 4 groups, p = 0.0009551 (p<.05).

5.1.3 Analysis of Individual nPVI values per phrase

The mean nPVI values were calculated for each group, two languages (Japanese and English) and three age groups (three, four and five years old). The number of phrases

which were used to calculate nPVI values as listed in Table 5. 4 for each nationality and age group.

	3yo	4yo	5yo
ENG	10	25	25
JPN	16	34	33

Table 5.4 Numbers of phrases used for nPVI calculation per group on "Twinkle, Twinkle, Little Star" singing

Data for Japanese singers were nearly double compared to those data available for the English singers, although the total numbers of phrases used in the comparison were not so different between the two language groups. As explained earlier, it was necessary to eliminate some phrases from the Japanese singing because of a poor recording context. Some phrases were unable to be separated between the singing voice and background noise and other children's voices.

For this first song in the current study, box plots were generated for nPVI scores for 144 song fragments from n=20 Japanese and n=13 English children (between them aged 3, 4 and 5 years) singing the nursery rhyme ‘Twinkle, Twinkle, Little Star’ (see Table 5. 5 and Figure 5. 4). Visual inspection of the boxplots suggested that there was variation between ages and also language groups.

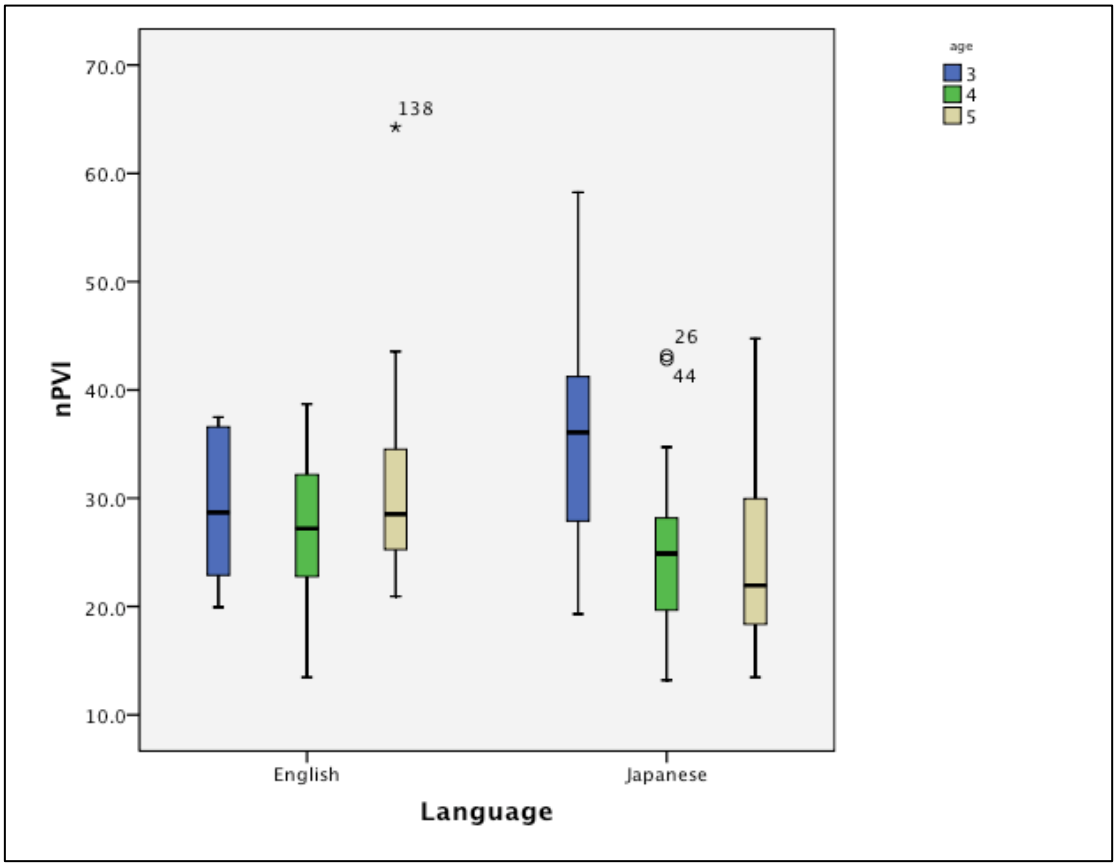


Figure 5.4 nPVI boxplots for ‘Twinkle, Twinkle’ by age and language group

nPVI	name	language	age	sex	phrase No.	nPVI	name	language	age	sex	phrase No.
37.3	1	Japanese	3	m	1	29.79	21	English	3	f	1
51.23	1	Japanese	3	m	2	19.93	21	English	3	f	2
42.3	1	Japanese	3	m	3	36.67	21	English	3	f	3
58.26	1	Japanese	3	m	4	27.58	21	English	3	f	4
40.13	1	Japanese	3	m	5	23.19	22	English	3	m	1
41.24	2	Japanese	3	m	1	30.23	22	English	3	m	2
35.83	2	Japanese	3	m	2	36.58	23	English	3	f	1
25.68	2	Japanese	3	m	3	37.49	23	English	3	f	2
26.05	2	Japanese	3	m	4	22.88	23	English	3	f	3
36.31	3	Japanese	3	m	3	22.86	23	English	3	f	4
32.3	4	Japanese	3	m	3	30.44	24	English	4	m	1
19.31	4	Japanese	3	m	4	28.27	24	English	4	m	2
24.69	5	Japanese	3	m	1	38.7	24	English	4	m	3
29.74	5	Japanese	3	m	5	28.4	24	English	4	m	4
32.19	5	Japanese	3	m	6	38.65	24	English	4	m	5
41.2	6	Japanese	3	f	1	20.69	25	English	4	f	1
27.06	7	Japanese	4	f	1	34.25	25	English	4	f	2
24.67	7	Japanese	4	f	2	19.37	25	English	4	f	3
19.19	7	Japanese	4	f	3	27.69	25	English	4	f	4
19.67	7	Japanese	4	f	5	28.29	25	English	4	f	5
31.65	8	Japanese	4	f	1	25.04	26	English	4	m	1
28.17	8	Japanese	4	f	2	24.03	26	English	4	m	2
19.2	8	Japanese	4	f	3	34.68	26	English	4	m	3
29.14	8	Japanese	4	f	4	20.75	26	English	4	m	4
34.73	8	Japanese	4	f	5	33.02	26	English	4	m	5
43.18	9	Japanese	4	f	1	22.76	27	English	4	f	1
27.57	9	Japanese	4	f	2	32.25	27	English	4	f	2
26.67	9	Japanese	4	f	3	19.42	27	English	4	f	3
29.09	9	Japanese	4	f	4	22.97	27	English	4	f	4
24.32	9	Japanese	4	f	5	26.97	27	English	4	f	5
20.41	10	Japanese	4	f	1	27.21	28	English	4	m	1
27.89	10	Japanese	4	f	2	24.8	28	English	4	m	2
25.11	10	Japanese	4	f	3	20.97	28	English	4	m	3
27.28	10	Japanese	4	f	4	32.18	28	English	4	m	4
21.18	10	Japanese	4	f	5	13.47	28	English	4	m	5
25.66	11	Japanese	4	f	1	29.41	29	English	5	m	1
21.77	11	Japanese	4	f	2	36.21	29	English	5	m	2
13.19	11	Japanese	4	f	3	31.02	29	English	5	m	3
18.66	11	Japanese	4	f	4	27.03	29	English	5	m	4
29.55	11	Japanese	4	f	5	26.31	29	English	5	m	5
20.87	12	Japanese	4	f	1	34.21	30	English	5	m	1
15.59	12	Japanese	4	f	2	26.14	30	English	5	m	2
22.27	12	Japanese	4	f	3	43.54	30	English	5	m	3
42.79	12	Japanese	4	f	4	28.53	30	English	5	m	4
16.06	12	Japanese	4	f	5	26.08	30	English	5	m	5
25.66	13	Japanese	4	f	1	24.61	31	English	5	m	1
21.77	13	Japanese	4	f	2	27.89	31	English	5	m	2
13.19	13	Japanese	4	f	3	25.26	31	English	5	m	3
18.66	13	Japanese	4	f	4	21.18	31	English	5	m	4
29.55	13	Japanese	4	f	5	20.93	31	English	5	m	5
37.5	14	Japanese	5	f	1	34.19	32	English	5	f	1
18.61	14	Japanese	5	f	2	34.76	32	English	5	f	2
21.94	14	Japanese	5	f	3	37.3	32	English	5	f	3
23.57	14	Japanese	5	f	4	39.02	32	English	5	f	4
18.01	14	Japanese	5	f	5	64.26	32	English	5	f	5
26.34	15	Japanese	5	f	1	24.59	33	English	5	f	1
22.77	15	Japanese	5	f	2	21.64	33	English	5	f	2
17.09	15	Japanese	5	f	3	34.52	33	English	5	f	3
34.28	15	Japanese	5	f	4	33.44	33	English	5	f	4
16.57	15	Japanese	5	f	5	24.63	33	English	5	f	5
19.93	16	Japanese	5	f	1						
22.08	16	Japanese	5	f	2						
44.75	16	Japanese	5	f	3						
39.34	16	Japanese	5	f	4						
19.58	16	Japanese	5	f	5						
25.25	17	Japanese	5	f	1						
35.51	17	Japanese	5	f	2						
16.59	17	Japanese	5	f	3						
38.63	17	Japanese	5	f	4						
32.25	17	Japanese	5	f	5						
19.36	18	Japanese	5	m	1						
18.25	18	Japanese	5	m	2						
20.87	18	Japanese	5	m	3						
17.19	18	Japanese	5	m	1						
21.48	19	Japanese	5	m	1						
22.91	19	Japanese	5	m	2						
34.83	19	Japanese	5	m	3						
27.19	19	Japanese	5	m	1						
13.46	20	Japanese	5	m	1						
17.06	20	Japanese	5	m	2						
21.89	20	Japanese	5	m	3						
29.97	20	Japanese	5	m	4						
18.36	20	Japanese	5	m	5						

Table 5.5 nPVI scores for Japanese and English children singing ‘Twinkle, Twinkle’ by phrases

The results of two-way anova analysis showed the significant differences on the factor B: age, F (2, 137) = 6.846 (p<.005), and factor AB: language-age, F (2, 137) = 7.665 (p<.001) (see table 5.6).

source	SS	df	MS	F	p
A: language	7.8715232	1	7.8715232	0.126	0.7232
B: age	855.7397611	2	427.8698805	6.846	0.0015 ***
AB	958.0746363	2	479.0373182	7.665	0.0007 ****
error[WC]	8562.1487012	137	62.4974358		

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001

Table 5.6 Analysis of Variance

The Ryan's method on Factor B: age showed significant difference between age 3 and age 4 groups, p = 0.0007584 (p<.05), and between age 3 and age 5 groups, p = 0.0189274 (p<.05).

The simple main effect test on Facotr AB: language-age showed the significant differences on the languae factor for age 3 groups, F (1, 137) = 8.097 (p<.01), on the language factor for age 5 groups, F (1, 137) = 6.545 (p<.05), and on the age factor on Japanese group, F (2, 137) = 13.193 (p<.001).

A Ryan's method for Japanese age groups showed significant differences between age 3 and age 5 groups, p = 0.0000076 (p<.05), and between age 3 and age 4 groups, p = 0.0000082 (p<.05).

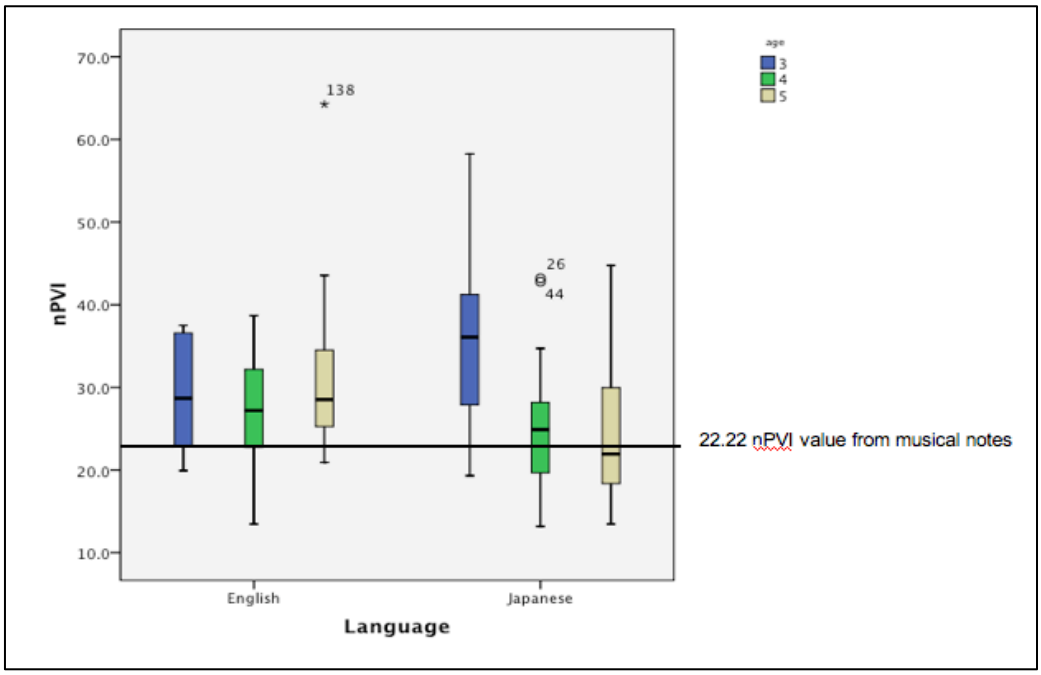


Figure 5.5 nPVI boxplots for 'Twinkle, Twinkle' by age and language group with a line indicating the nPVI value from the musical score

Further visual inspection of the boxplots suggested that all age groups in the English language group sang with higher nPVI scores than 22.22, which was calculated from the music notation, while some of Japanese four and five year old groups sang with a lower nPVI score (see Figure 5. 5).

The age differences (3yo, 4yo and 5yo) among each language group (Japanese and English) were a focus for further analysis. The difference between age groups, and within language groups was shown in the figure 5. 6. They show the mean nPVI values of each group.

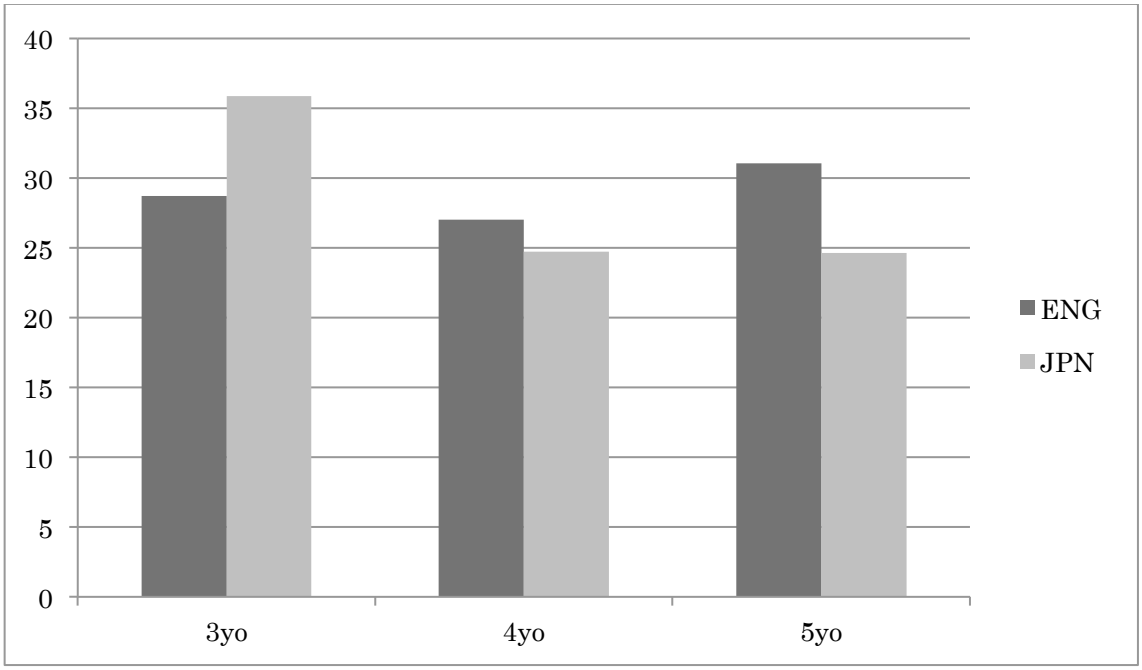


Figure 5.6 Mean nPVI values for each age group singing “Twinkle, Twinkle, Little Star” by nationality

The Figure 5. 6 suggests that;

(1) There was a clear difference between 3yo versus 4 and 5yo among the Japanese language group.

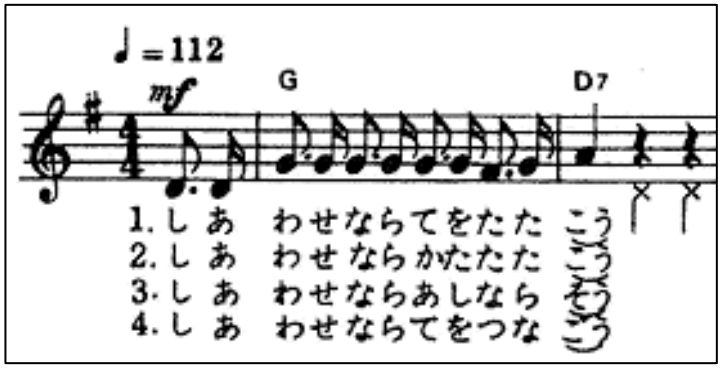
(2) There were no significant differences between age groups for the English language group.

(3) This is a tendency between 3yo and 5yo to be opposite between the two nationalities. The mean nPVI value of the 3yo Japanese group was higher than the 4yo and 5yo Japanese group, and the difference was significant. The mean nPVI value of the 3yo Japanese group was quite high at 35.86 compared to the nPVI value from music score of 22.22). The 4yo and 5yo Japanese group’s nPVI values were similarly low (4yo = 24.75, 5yo = 24.65).

5.2 Analysis of "If You're Happy and You Know It"

5.2.1 nPVI value from a phrase of "It you're happy and you know it"

The nPVI value per phrase was calculated from four successive so-called "dotted" rhythms (dotted rhythm, "takka no rizumu" in Japanese, consists of one dogged eighth note followed by a sixteenth note, see Figure 5. 7 below).



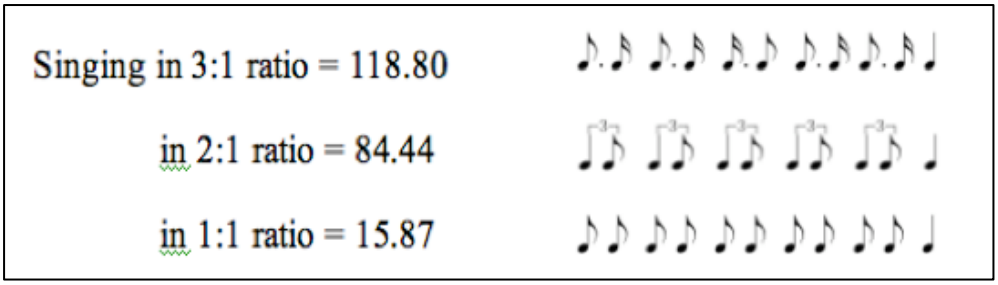


Figure. 5.7 Music score of a phrase from "If You're Happy and You Know It" with lyrics in English (above) and Japanese, and this nPVI values calculated in possible ratios of tone length, 3:1, 2:1 and 1:1

nPVI values per phrase were calculated in 3:1, 2:1, and 1:1 ratios of the tone length. If the "dotted rhythm" was calculated by a 3:1 ratio tone length according to the

exact tonal length from the music score, the nPVI value was 118.80. The nPVI value of 2:1 ratio, which is considered likely to be the most popular rhythmic pattern among Japanese children, was 84.44. The 1:1 ratio nPVI value was calculated for the case in which the song was sung in equal-timed notes (successive 10 eighth notes), with the value of 15.87.

5.2.2 Analysis on individual nPVI values per singers

Overall, n=17 Japanese (5 three year olds, 8 four year olds, and 4 five year olds), and n=13 English (4 three year olds, 5 four year olds, and 4 five year olds) children's sung products were chosen for nPVI analysis. The singing was separated for each phrase to calculate its nPVI value, then an average nPVI value for each singer was computed as below (see Table 5. 6).

nPVI	name	Language	age	sex
67.05	1	Japanese	3	m
62.03	2	Japanese	3	m
111.51	3	Japanese	3	m
93.15	4	Japanese	3	m
121.65	5	Japanese	3	m
100.87	6	Japanese	4	f
44.9	7	Japanese	4	f
57.33	8	Japanese	4	f
95.7	9	Japanese	4	f
95.05	10	Japanese	4	m

87.06	11	Japanese	4	m
89.48	12	Japanese	4	m
121.83	13	Japanese	4	f
29.55	14	Japanese	5	f
47.88	15	Japanese	5	f
94.49	16	Japanese	5	m
131.55	17	Japanese	5	f
49.29	18	English	3	f
46.68	19	English	3	m
20	20	English	3	f
126.16	21	English	3	f
63.25	22	English	4	m
62.55	23	English	4	f
84.03	24	English	4	m
120.46	25	English	4	m
128.3	26	English	4	f
71.25	27	English	5	f
102.15	28	English	5	f
29	29	English	5	f
88.67	30	English	5	f

Table 5.7 Average nPVI scores for Japanese and English children for ‘If You’re Happy And You Know It’

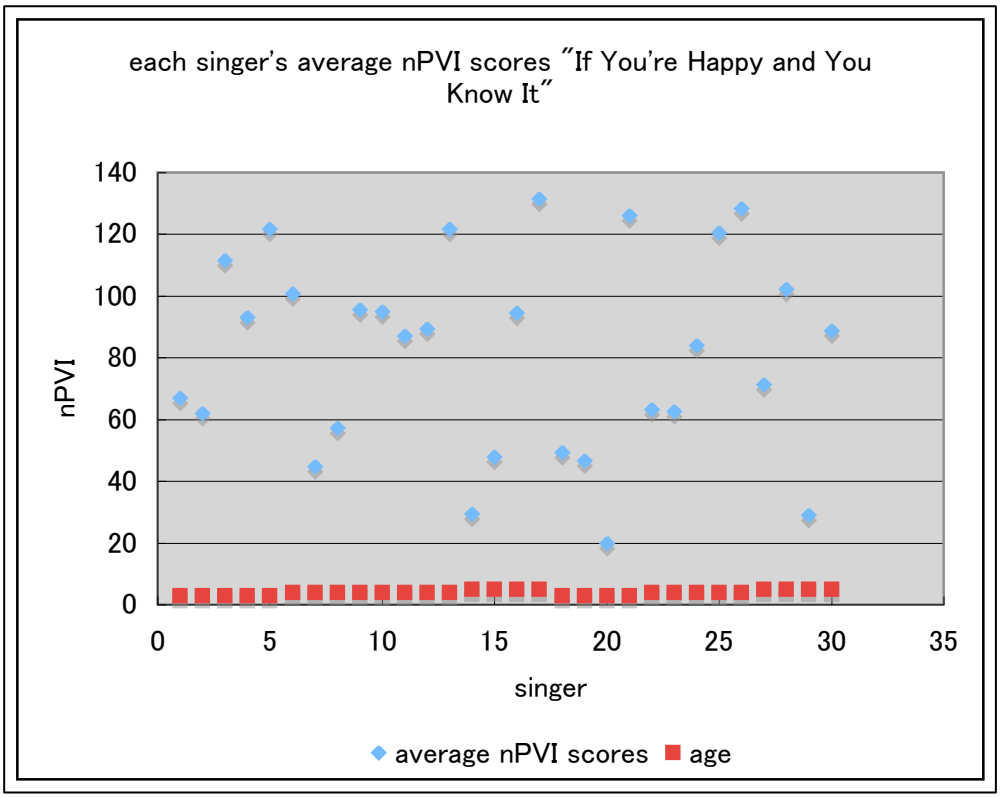


Figure 5.8 Each singer's average nPVI socre for 'If you're happy and you know it'

In Figure 5. 8, singers who were numbered 1 to 17 were Japanese, and 18 to 30 were the English group children. As can be seen also in table 5. 6, average nPVI score for individual singers looked varied. Significant difference was not found between the two language groups (Two-way ANOVA, F (1, 24) = 0.574, n.s.), nor found among age groups (Two-way ANOVA, F (2, 24) = 0.566, n.s.), nor both factors; language and age (Two-way ANOVA, F (2, 24) = 0.744, n.s.)(Table 5.7, and as illustrated in the box plots, Figure 5.9)

source	SS	df	MS	F	p
A:language	635.0487203	1	635.0487203	0.574	0.4560
B:age	1251.0262935	2	625.5131468	0.566	0.5754
AB	1646.3133100	2	823.1566550	0.744	0.4857
error[WC]	26543.4790217	24	1105.9782926		

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001

Table 5.8 Table of Analysis of Variance "If You're Happy and You Know It" nPVI values

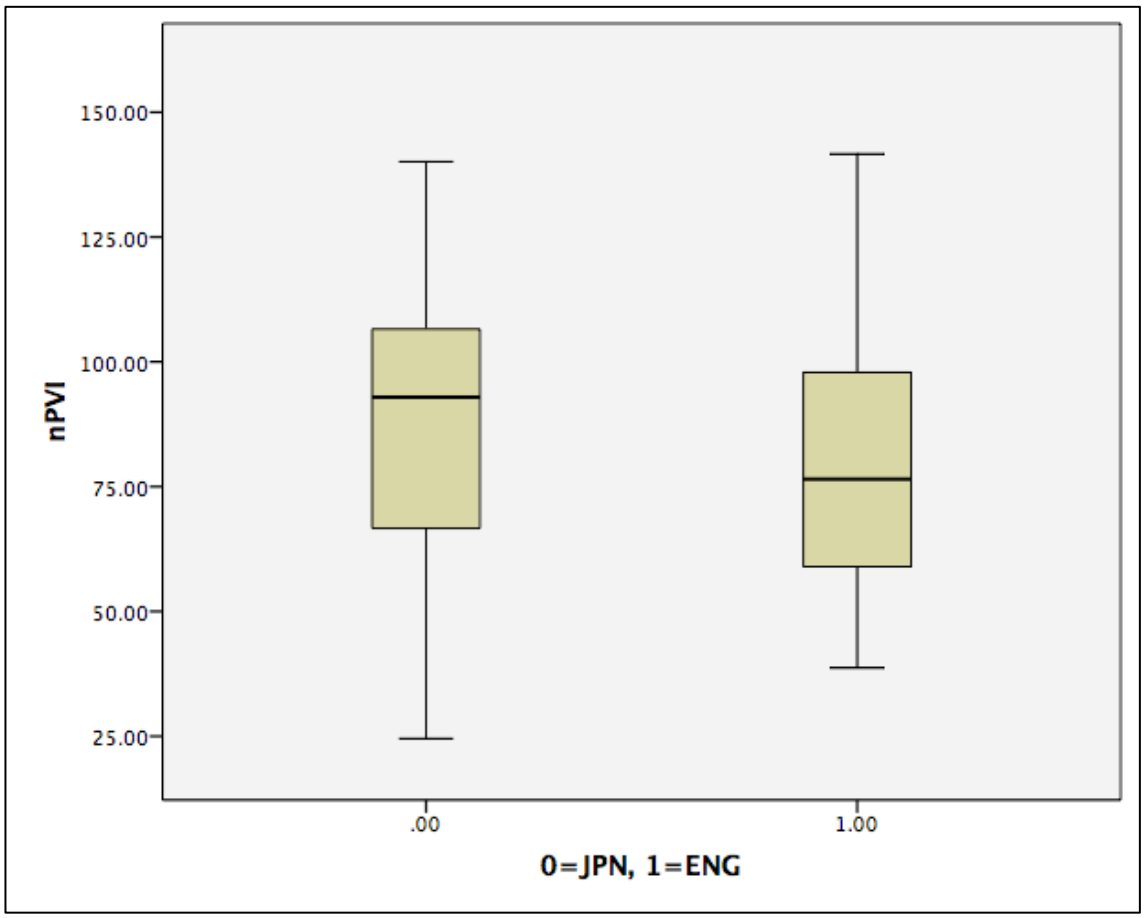


Figure 5.9 Overall nPVI boxplots for "If You're Happy And You Know It" for Japanese and English group

5.2.3 Analysis on mean nPVI values on each group

In the second song in the current study, boxplots were generated for nPVI scores for 108 song fragments from n=17 Japanese and n=13 English children (between them aged 3, 4 and 5 years) singing the nursery rhyme 'If You're Happy And You Know It' (see Table 5. 8. and Figure 5. 10).

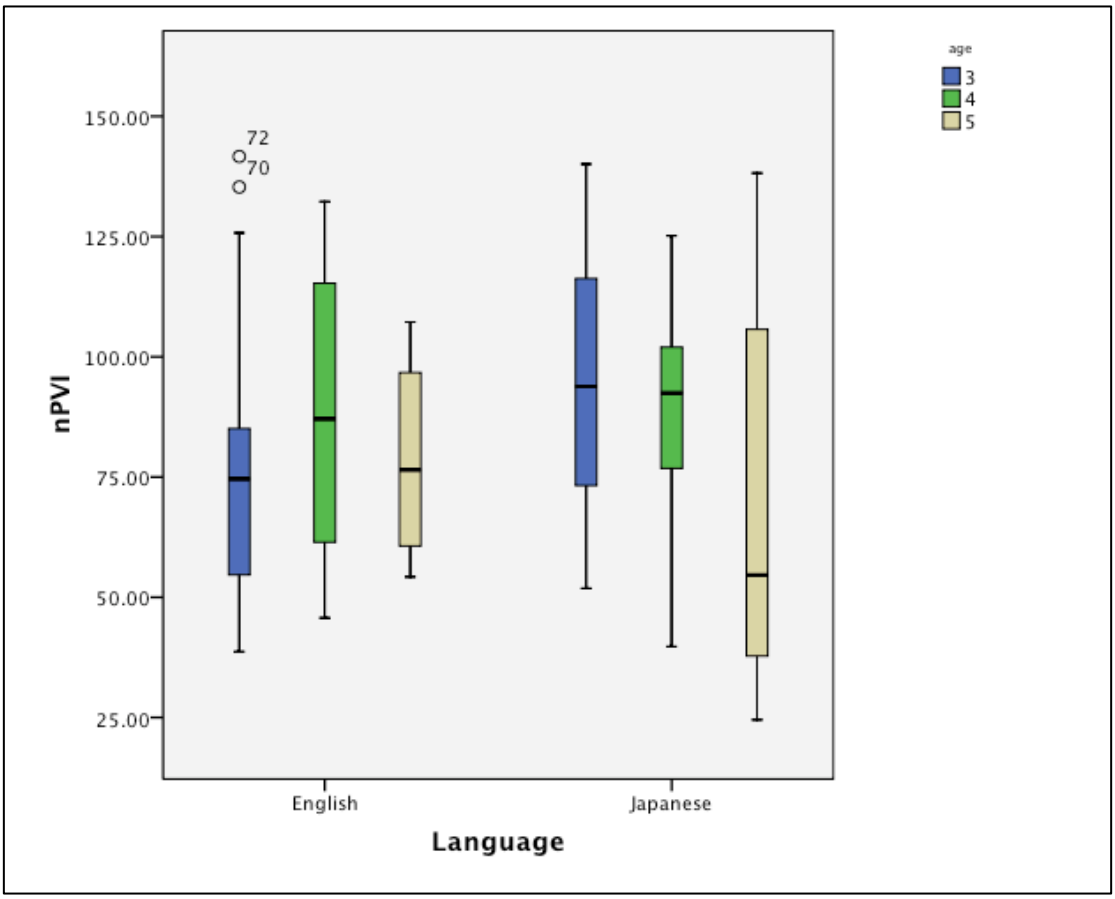


Figure 5.10 nPVI boxplots for 'If You're Happy' by age and language groupwith 3:1, 2:1 and 1:1 ratio nPVI value

There were no significant differences between the two language groups, nor between age groups (across or within language groups). A two-way ANOVA was carried over nPVI values per phrases, though significant difference was not found. Factor A: language was F (1, 101) = 0.813. Factor B: age was F (2, 101) = 2.052. Factor AB: language-age was F (2, 101) = 1.550

The number of phrases which were calculated for nPVI analysis (per groups) are listed in the table below (Table 5. 7).

	3yo	4yo	5yo
ENG	17	17	17
JPN	19	24	13

Table 5.9 Numbers of phrases for the nPVI analysis on “If You’re Happy And You Know It”

Mean nPVI values were calculated from children’s actual singing tone length and are listed in the table below (table 5. 8).

	3yo	4yo	5yo
ENG	77.73	86.18	78.11
JPN	95.75	89.09	72.3

Table 5.10 mean nPVI values per phrase of each group

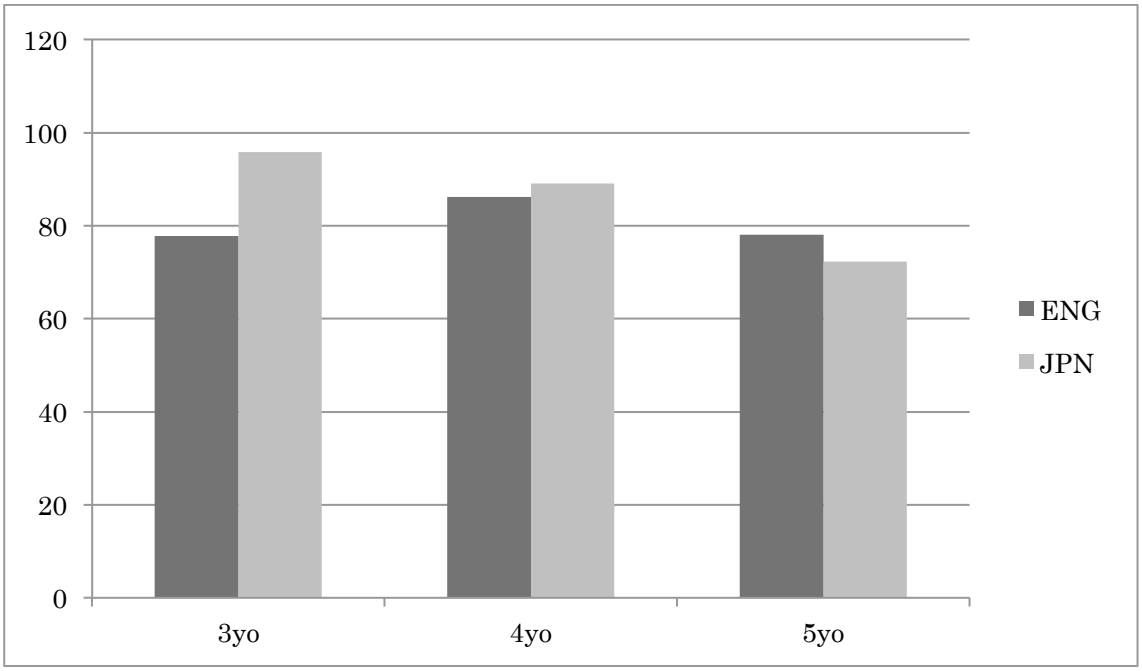


Figure 5.11 mean nPVI values per phrase of each age and nationality groups for "If you're happy and you know it"

The data in the figure (5. 11) above suggests that:

(1) the tendencies of each language group were different between the 3yo and 5yo;

(2) the same tendencies in language rhythm were found in 5yo groups in both languages;

(3) a difference between language groups was not found in 4yo groups;

(4) a contradicting tendency to the language rhythm were found in 3yo groups: the 3yo English group singing in more equal-timed rhythm, and 3yo Japanese group in more "dotted" or random rhythm.

5.2.4 nPVI distance from singing in 3:1 and 2:1 ratio rhythm models

The distance from the model nPVI values for singing in 3:1 and 2:1 ratios was analyzed to see whether children's singing rhythm was closer to either of the two models. The 3:1 ratio rhythm is the case when the singing rhythm was a reproduction with a very accurate dotted rhythm, which consisted of repetition of the pair of a dotted eighth note followed by a sixteenth note. The table below (5. 9) shows the nPVI score distance from the 3:1 model rhythm to the actual singing phrase for each age group by nationality.

3:1 ENG			3:1 JPN		
3yo	4yo	5yo	3yo	4yo	5yo
66.25	64.94	52.81	47.66	27.04	93.45
72.94	61.48	42.3	43.44	15.99	88.26
77.11	66.96	18.64	64.16	12.3	81.04
61.73	28.82	19.76	50	16.4	94.27
64.13	55.27	11.58	53.38	75.1	64.18
80.11	39.26	16.62	66.93	72.71	71.78
44.17	57.37	53.09	25.77	55.43	76.8
44.46	73.11	58.12	24.96	79.05	25.99
60.67	31.44	54.54	-13.85	49.94	33.87
42.6	31.7	59.01	24.78	17.22	25.99
40.81	46.22	61.25	-21.29	18.02	33.87
38.85	29.74	64.57	11.91	34.06	13.08
33.71	-6.82	59.01	5.07	28.3	-11.69
-16.5	3.51	31.55	-3.97	29.22	-7.19
-6.95	-5.26	35.59	12.19	19.86	-19.37
-22.84	-9.77	22.06	25.23	17.61	
16.87	-13.46	31.31	26.08	50.91	

			0.01	25.63	
			-4.54	18.67	
				30.2	
				28.44	
				-6.36	
				1.24	
				-3.97	

Table 5.11 nPVI distance from the model data for singing in 3:1 ratio rhythm with the actual sung values

From the results of Two-way ANOVA, significant differences were not found between the groups on the factor A (language, $F(1, 103) = 1.116$, n.s.), factor B (language, $F(2, 103) = 1.768$, n.s.), nor factor AB (language, $F(2, 103) = 1.370$, n.s.) on the distance from 3:1 dotted rhythm model.

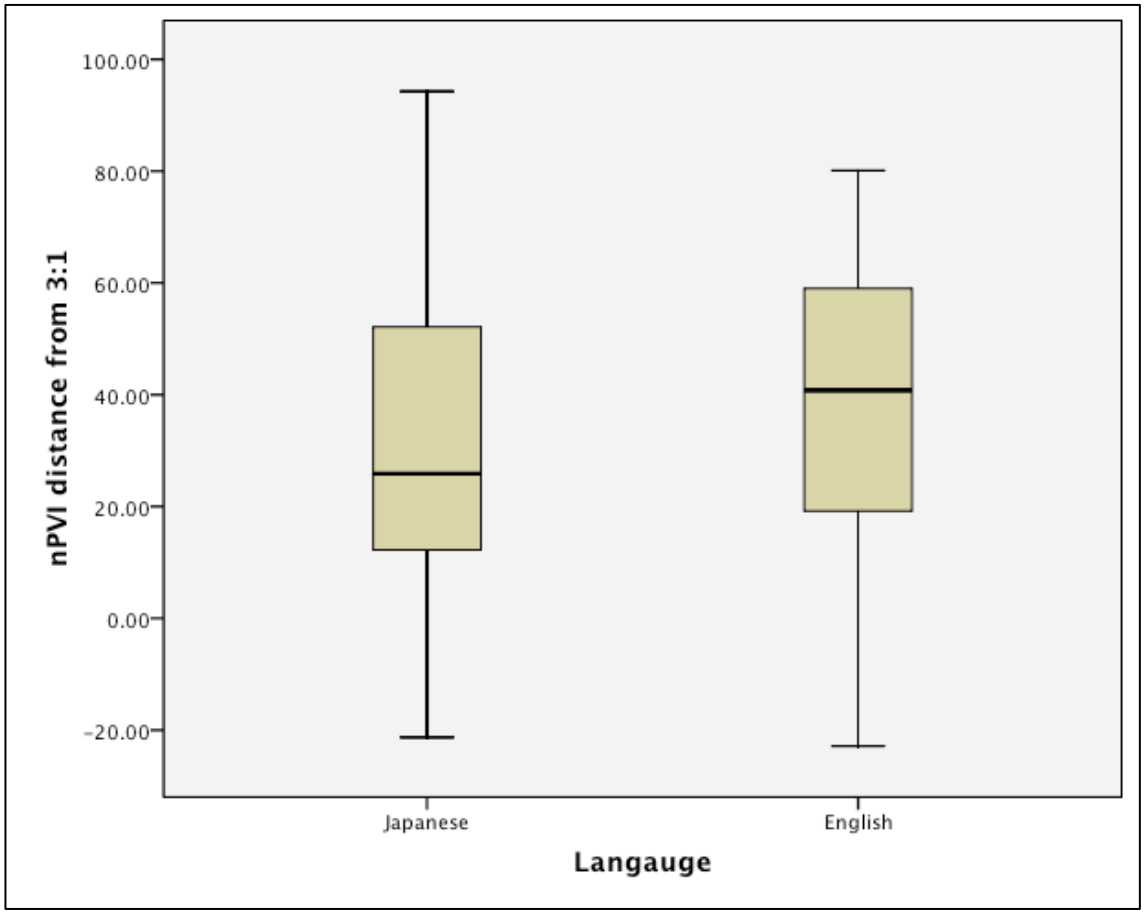


Figure 5.12 Boxplots of distance score from the 3:1 model rhythm

The distance from the 2: 1 model was also analyzed. The 2:1 rhythm is the case where the sung rhythm was in swing rhythm, which written in music notation is a repetition of a pair of eighth notes, followed by a sixteenth note in triplet rhythm. The table below (5. 10) shows the nPVI score distance from the 2:1 model rhythm to the actual singing phrase.

2:1 ENG			2:1 JPN		
3yo	4yo	5yo	3yo	4yo	5yo
31.89	30.58	18.45	13.3	-7.32	59.09
38.58	27.12	7.94	9.08	-18.37	53.9
42.75	32.6	-15.72	29.8	-22.06	46.68
27.37	-5.54	-14.6	15.64	-17.96	59.91
29.77	20.91	-22.78	19.02	40.74	29.82
45.75	4.9	-17.74	32.57	38.35	37.42
9.81	23.01	18.73	-8.59	21.07	42.44
10.1	38.75	23.76	-9.4	44.69	-8.37
26.31	-2.29	20.18	-48.21	15.58	-0.49
8.24	-2.66	24.65	-9.58	-17.14	-21.28
6.45	11.86	26.89	-55.65	-16.34	-46.05
4.49	-4.62	30.21	-22.45	-0.3	-41.55
-0.65	-41.18	24.65	-29.29	-6.06	-53.73
-50.86	-30.85	-2.81	-38.33	-5.14	
-41.31	-39.62	1.23	-22.17	-14.5	
-57.2	-44.13	-12.3	-9.13	-16.75	
-17.49	-47.82	-3.05	-8.28	16.55	
			-34.35	-8.73	
			-38.9	-15.69	
				-4.16	
				-5.92	
				-40.72	
				-33.12	
				-38.33	

Table 5.12 nPVI distance from the model data of singing in 3:1 ratio rhythm

The results from two-wat anova were again not significantly different Significant differences were not found between the groups on the factor A (language, F (1, 103) = 1.116, n.s.), factor B (language, F (2, 103) = 1.768, n.s.), nor factor AB (language, F (2, 103) = 1.370, n.s.) on the distance from 3:1 dotted rhythm model. (as illustrated in Figure 5. 14).

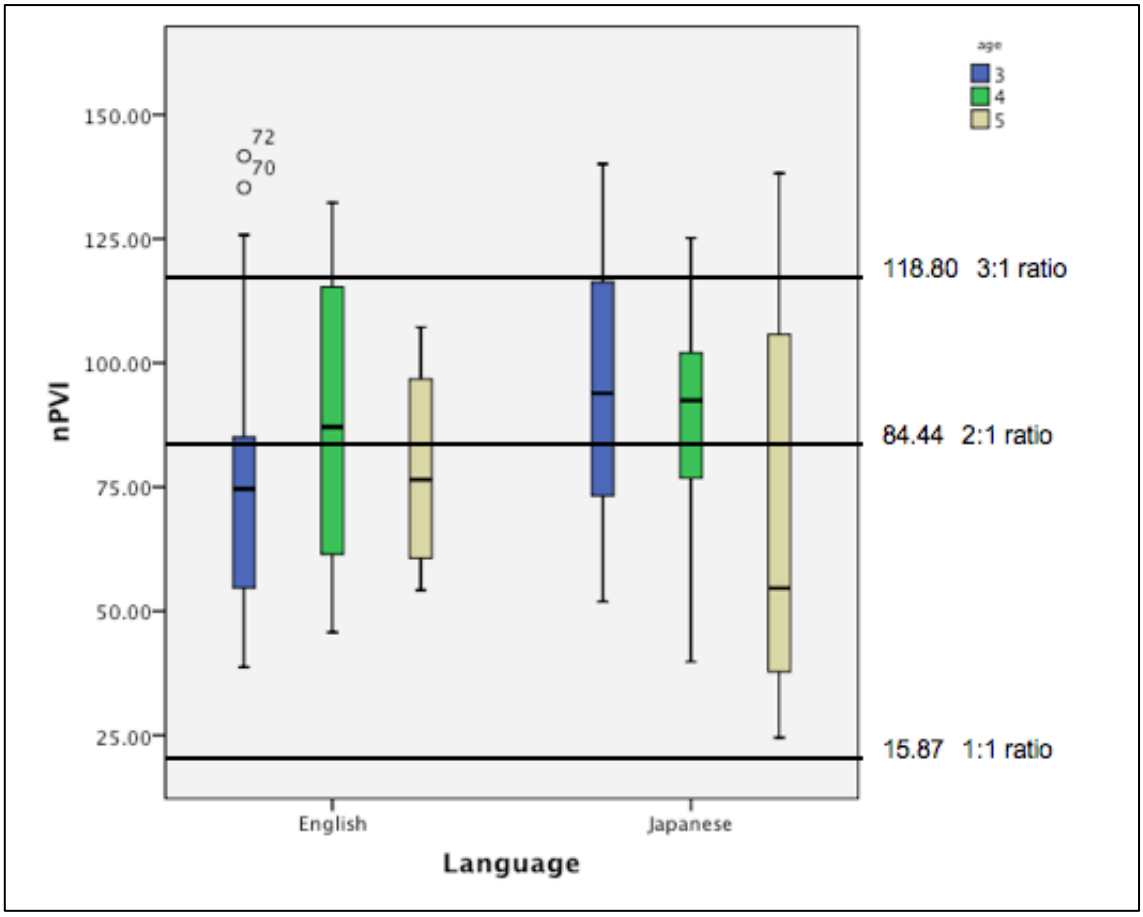


Figure 5.13 nPVI boxplots for 'If You're Happy' by age and language group with 3:1, 2:1 and 1:1 ratio nPVI value

When the data for 'If You're Happy' is compared to the ideal ratios of 3:1 and 2:1, the median scores (see boxplots in the Figure 5.13) tend to be much closer to 2:1 for the English children, but more varied for the Japanese children. However, there is no evidence than either nationality sung using the 3:1 model. Both nationalities were much closer to 2:1 (see Figure 5. 14).

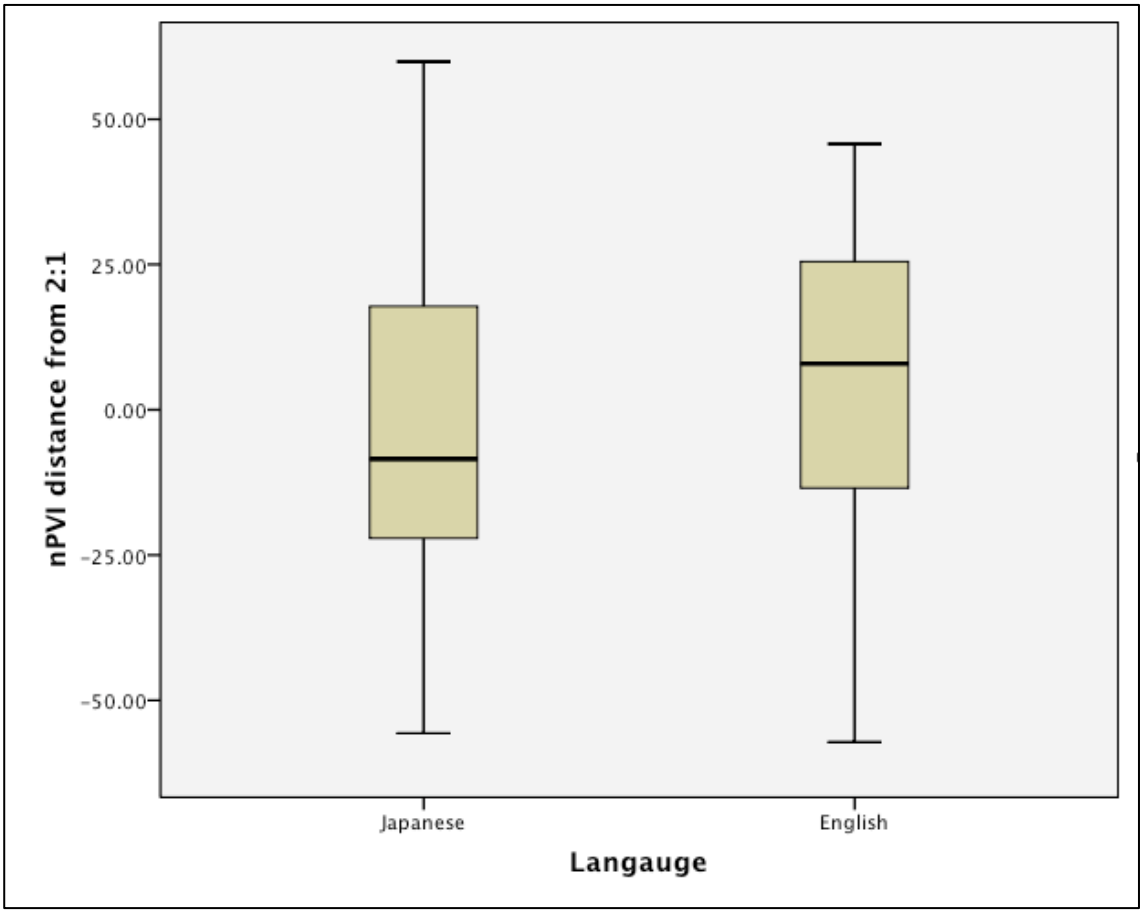


Figure 5.14 Boxplots of distance score from the 2:1 model rhythm by nationality

5.3 Summary

Some common tendencies were found in the results from the two songs "Twinkle, Twinkle, Little Star" and "If You're Happy and You Know It". They were as follows:

- The three year old groups' nPVI scores in singing rhythm contradicted that of the language rhythm in both language groups;
- The five year old group's nPVI score in singing rhythm showed the same tendency to that of the language rhythm in both language groups;

- There was no significant difference between the two language groups in the four year-old groups.
- The three year-old Japanese children tended to be furthest in their nPVI scores from the national language score for both songs. There appeared to be greater uniformity in the sung data for the English children compared to the generated nPVI language scores.

Chapter 6 Discussion

6.1 Discussion on "Twinkle, Twinkle, Little Star" results: successive eighth notes 1:1 rhythm

Firstly, a statistical difference was found between the age groups, $F(2, 27) = 3.835$ ($p<.05$), and the difference was smaller for four years olds and five years olds. However, the difference between the two language groups was not significant. This may be expected for two reasons. One is that the actual singing task was relatively simple, notwithstanding the languages of the lyrics. The written song in the music score was exactly the same in both rhythm and melody. Another reason may be that, of the completed responses, only those where the singing was accomplished without any error in rhythm were chosen for analysis. Therefore. all the sung products were roughly in the same rhythm. The nature of the analysis for this study was only focused on tiny differences in vocal products, which are evident in the music score. That is to say, any difference in singing rhythm may have occurred due to a habit or custom of muscle movements around the oral cavity, which were likely to be effected by the language of the lyrics. This was the focus of this analysis, namely to investigate how the language rhythm might be influencing singing rhythm by age group.

Secondly, there were differences between ages for the Japanese speaking children, but less so for the English speaking children. There was a big gap between 3yo and 4-5yo in the Japanese language group. A significant difference was found here. The mean nPVI value for the 3yo Japanese group (35.86) was significantly higher than 4yo (24.75) and 5yo (24.65).

This result suggests that Japanese children's singing rhythm gets closer to the native language rhythm at the ages of four and five. In comparison, Japanese three year olds' singing rhythm appears to be still relatively random at in this small sample. Each musical tone was uttered in a more varied length by the three year olds, but the length of tones become more controlled in utterances of similar length for four year olds in their singing. This suggests that Japanese children become able to sing with a more certain sense of rhythmic beat at the age of four, but that they could not control the rhythm to produce a common stable beat at the age of three. On the other hand, the results from the English groups show no significant differences, although there was a slight tendency in which 5 year olds' mean nPVI value was higher than that of the 4 years olds (5yo = 31.07, 4yo = 27.01). A tendency for the nPVI value to get higher with age, suggests that the length of each musical note became more random at the age of five for the group than four.

To compare the different tendencies between the two language groups, Japanese and English, mean nPVI values were re-calculated for two age categories, 3yo versus 4-5yo. The figure 6.1 and table 6.1 below show the mean nPVI of each age category and language group.

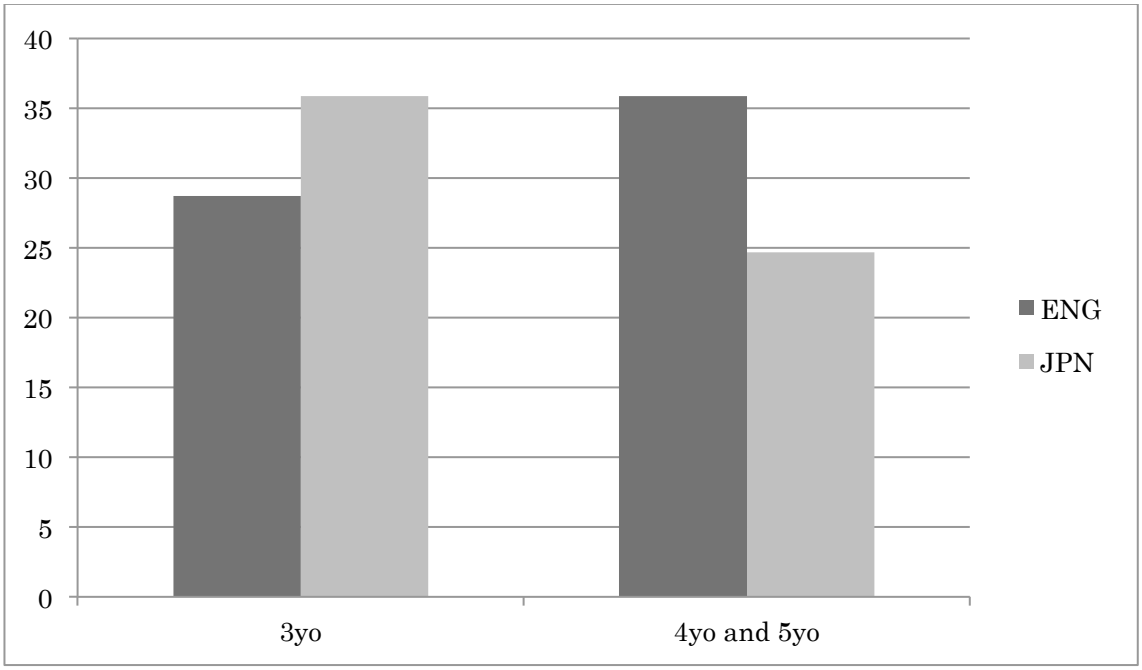


Figure 6.1 mean nPVI values of 3yo vs. 4yo and 5yo in Japanese and English, in singing "Twinkle, Twinkle, Little Star"

	3yo	4yo and 5yo
ENG	28.72	29.04
JPN	35.86	24.7

Table 6.1 mean nPVI values of 3yo vs. 4yo and 5yo in Japanese and English, in singing "Twinkle, Twinkle, Little Star"

A significant difference was found between age categories in the Japanese language group. As mentioned above, Japanese children's singing rhythm was relatively random at three years old. Then it becomes more equal-timed rhythm at four or five years old. The equal-timed rhythm means virtually accurate rhythm in the song "Twinkle, Twinkle,

Little Star", in terms of the accuracy treated as an exactness compared to the music score with an nPVI value of 22.22. An equal-timed rhythm is a characteristic of Japanese language rhythm, which is mora-based. Thus it could be inferred that language culture in Japan shapes children's vocal products towards its cultural norms. For children in the English group, they do not face the same psychological task that Japanese children do. English does not have a cultural bias towards an even, regular language rhythm. Therefore children can sing more freely without linguistic constraints of the task that the Japanese have.

Japanese children's singing rhythm was more uniform than the English at the ages of four and five (especially at age five). English lyrics have a phonetic structure, which consist of syllables, and the syllables in this song were often heavy syllables (the structure is CCVC or CVCC). Heavy syllables in English are longer than in the Japanese phonetic structural unit mora. Mora are short and simple structures such as CV, V, and C structure in Japanese. Because English lyrics have a long, heavy syllable structure (Kubozono, 1995), arguably there is more range and leeway to play with the phonetic sounds. Children who sing with Japanese lyrics produce a relatively rigid singing rhythm, because they have a target to sing in an equal-timed (and accurate in this song) rhythm; and because the phonetic structure of the language is a simple CV type moraic structure.

Focusing on the language differences in singing the song "Twinkle, Twinkle, Little Star", further implications are revealed. This song has exactly the same melody (tone processing) and rhythmic patterns when it is written as a musical score. The only difference would seem to be in the use of language for singing. However, the difference was clear when we compare the task on a phonetic level, singing in English lyrics 'twin-kle, twin-kle, lit-tle star…' and in Japanese 'ki-ra ki-ra hi-ka-ru…'.

Music rhythm： ♪ ♪ ♪ ♪ ♪ ♪ ♩

Japanese lyric： ki - ra ki - ra hi - ka - ru

English lyric： twin- k(v)le, twin- k(v)le lit - t(v)le star

（v） shows vowels which are not in the spelling of the word, but are filled when singing.

The Japanese language is simpler when compared to English in terms of phonology, although this does not mean that it is easier to pronounce it naturally. The song “Twinkle, Twinkle, Little Star” in Japanese has a simple moraic structure, with one musical tone consisting in a CV structure mora (open syllable structure, a consonant followed by a vowel, and which is equivalent to a Japanese letter),

Music rhythm： ♪ ♪ ♪ ♪ ♪ ♪ ♩

Japanese lyric： ki - ra ki - ra hi - ka - ru

Japanese letter: き ら き ら ひ か る

Syllable type : cv cv cv cv cv cv cv

Japanese language rhythm does not have a strong-weak accent, therefore, each mora is pronounced equally in a flat intonation.

On the other hand, in the English lyric, one musical tone is filled with longer structured syllables than Japanese, such as CCVC, CVCC or CVC.

Music rhythm：	♪	♪	♪	♪	♪	♪	♩
English lyric：	twin-	k(v)le,	twin-	k(v)le	lit -	t(v)le	star
Syllable type :	ccvc	cvcc	ccvc	cvcc	cvc	cvc	ccvc

The syllables are pronounced in strong-weak accent in trochee rhythm. The first syllables of twinkle and little (twink, lit) and the word ‘star’ are accented. This lyric rhythm fits to the music rhythm of this song naturally. In terms of psychology, the mental image of singing in a Japanese lyric is adding each mora and/or letter one by one;

‘き＋ら＋き＋ら＋ひ＋か＋る…’.

(ki + ra + ki + ra + hi + ka + ru…)

While in English, it is dividing words into two syllables in a strong-weak accent;

‘twin - kle, twin - kle, lit - tle star’,

and adding extra vowels to fill those that are unwritten in spelling;

‘twin - k(v)le, twin - k(v)le, lit - t(v)le star’.

In noting the above difference, one can see the results of this analysis illuminate differences between the Japanese and English language groups. For Japanese children, there was a task to sing the song in accurate and equal-timed rhythm. Therefore, the behaviour is focused on the musical side. On the other hand, English children do not face the same task to sing with equal-timed rhythm. They sing freely in the natural rhythms which are emphasized in the rhythm of their mother tongue. Therefore their musical development and effort is perhaps less obvious.

To sum up, the results suggest an influence of mother tongue on children's singing rhythm. It is clear when comparing the two language groups at the ages of three and five. There is a significant difference between both five year-old groups. Curiously, the difference shown contradicts any tendencies between the ages of three and five (and between 3yo vs. 4-5yo age categories). At the age of three, the English group's mean nPVI value was lower than that of the Japanese. It implies that the Japanese singing rhythm is in cotrast to their mother tongue language rhythm. But there seems to be a tendency of the singing rhythm to become similar to the language rhythm at the age of four and five. In particular, the influence of the language rhythm becomes clear at the age of five. The difference between the language groups became wider for the older age group. From the analysis, there was a tendency for the influence of language (and culture) to get stronger, and to be reflected in their musical behaviour.

6.2 Discussion on the "If You're Happy And You Know It" results: singing in dotted 3:1 or shuffle 2:1 rhythm

Inspection of the data in Table 5.8 reveals that there were no major differences between English three year olds and five year olds in their nPVI scores (3yo = 77.23; 5y0 =

78.11). Both ratings (and that or 4 year olds' at 86.16) were close to the notional 2:1 (swing) rhythm nPVI of 84.44. None of the scores were near the implied notation of a 3:1 rhythm (118.80). For the Japanese children, there was the same tendency in as the previous song, i.e. nPVI scores reduced with age (3yo = 95.75; 4yo = 89.09; 5yo =72.03). Inspection of the data in more detail revealed other differences.

Possible reasons for the English language group sung behaviour

There was considerable variation among 3yo English children (see Figure 5. 10). Some of the children sung the song "If You're Happy and You Know It" clearly in an equal-timed rhythm (successive eighth notes). The reason for singing this dotted rhythm song in an equal-timed rhythm could be related to their music culture. English children's songs are often written in 6/8 metre. And in a 6/8 metre song, often one word is divided into two syllables, one long syllable followed by a short one as in a 2:1 ratio. This word division, one word into two syllables often happens in a 2/4 metre as well. Therefore, the border between rhythms sung in 2/4 and 6/8 metre can be vague. It is relatively easy to change the rhythm between 2/4 and 6/8 metres (two successive eighth notes to/for a quarter note followed by a eighth notes in triplet). It is reported to be easy to "shuffle" the rhythm" (Minami, 2003) (figure 6. 2).

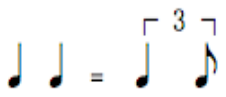


Figure 6.2 Shuffle rhythm as reported by Minami (2003)

Another factor for the English group may be in the lyric design. The lyric 'If you're hap-py and you know it…' does not have much evidence of division of one word into two syllables, which English children are familiar with. Most "dotted rhythm" (dotted eighth note followed by sixteenth note) is filled with two words, rather than the division of one word into two syllables. The latter division happened only on the word "happy" in this lyric.

Japanese language group

According to Koizumi (1984), the basic rhythm unit of Japanese traditional songs is 1:1 equal timed, a pair of "omote-ura (head-tail 裏表)" notes, though variations does exist from the basic rhythm. Triplet rhythm does not exist in Japanese music culture, and the "dotted rhythm" occurs only in certain cases, such as in the existence of weakened mora in a lyric; or in the sense of motion which is present in the singing of play songs (bouncing ball songs, play songs with a tapping/clapping motion). Actually, the 2:1 "dotted rhythm ("takka-no rizumu" in Japanese) is a popular rhythm used in Japanese children's songs, including *warabeuta* (traditional children's songs). Umemoto and Iwabuki's study (1990) also found that this dotted rhythm was the most popular rhythmic pattern when children were asked to improvise a song.

It suggests that Japanese children are familiarized with the "dotted rhythm" and have established schemata for it. Seeing children galloping around in the playground is an everyday sight in Japan. They acquire galloping skill earlier than skipping, through this play. Galloping and skipping, and dotted rhythm are all successive motion. It may be easy for young children to imitate the rhythm in songs because it could be a kinaesthetically repeated motion task.

6.3 Japanese and Western songbooks – an initial review

An analysis was undertaken of children's' Japanese and Western songbooks to investigate the rhythm and metre in use for the songs, focusing on duplet and triple rhythm (see also chapter 7). The results are given in a table below (6. 2).

	triplet (3/4, 3/8, 6/8)	duplet (2/4, 4/4etc.)
Japanese songs	6%	94%
Western songs	42%	54%

Table 6.2 Rhythm types in children's songs: triplet and duplet

Overall, 864 children's songs (402 in Japanese, 462 in English and French) were categorized according to their rhythmic types; triplet and duplet. The list of songbooks is given below;

<Japanese>

Kodomo no Uta 200 [こどものうた 200]. (1975). Kobayashi. Childsha: Tokyo.

<Western>

This Little Puffin. (1969). E. Matterson. Penguin Books Ltd: London.

Vieilles Chansons et Rondes. (1980) & *Chansons de France*. (1979) M. Boutet de Monvel. l'ecole des loisirs: Paris.

The Faber Book of Nursery Songs. Mitchell. (1968). Faber & Faber.

Great Song Book. Timothy.(1978). Doubleday.

Sing Hey Diddle Diddle. Harrop. (1991). A & C Black.

The Kingfisher Nursery Rhyme Songbook. Emerson. (1995). Kingfisher.

Only 6% of songs were in a triplet rhythm in the Japanese children's songbook from over 400 songs. This implies that Japanese children are not likely to be familiar with 6/8 or 3/4 metre songs. On the other hand, Western songs with a triplet rhythm were common, comprising 42% of the English and French songs. Also, more detailed analysis (Table 6. 3) revealed also that a "dotted rhythm" was not common among Western children's songs. Only 11 songs had this rhythm amongst the 462 songs, 2.58%.

Song book/metre	6/8	4/4	2/4	2/2	3/4 3/8	others	total
Kodomo no Uta 200 [*こどものうた 200*]	3	87 (d*=29)	102 (d=31)	1	9	0	202
This Little Puffin	27	81 (d=4)	22 (d=1,s=1)	0	4	2**	136
Vieilles Chansons et Rondes & Chansons de France	17	6	27 (d=3)	0	3	0	49
The Faber Book of Nursery Songs. Mitchell	38	15 (d=1)	12	11 (d=1)	11	5	92
Great Song Book	18	27 (d=1)	6	1	14	2	68
Sing Hey Diddle Diddle	30	12	15	1	9	1	68
The Kingfisher Nursery Rhyme Songbook	16	17	7	0	6	1	47

* d shows the number of dotted rhythms, is shuffle rhythm.

** One song has no indication of the metre, and is written without bar line. The metre has changed from 3/4 to 4/4 in another song.

Table 6.3 Metre and rhythm in sample children's songbooks from Japan and the West

To summarize the findings from these various analyses: first, there appears to be an influence of the mother tongue's language rhythm on children's singing development. As they age the same tendencies in language rhythm were found in 5yo groups in both languages. Secondly, the influence of language rhythm gets stronger as the children get older in Japan. The data showed that Japanese language groups' nPVI value significantly changed (dropped) from 3yo groups to 4yo, then 4yo to 5yo groups for both songs.

The curious result was found in the 3yo groups. Japanese 3yo children sang the song "If You're Happy and You Know It" in a more random rhythm than the English groups, and the English 3yo children sang in equal-timed rhythm, which seems to contradict their mother language rhythm. If the reason for this was due to their familiarity with the rhythm types, then perhaps cultural factors other than language may be implicated, such as any bias in the underlying rhythmic structure of songs in the children's cultures, as evidenced by the song book analysis.

6.4 Further analysis on "If You're Happy And You Know it": singing in 3:1 dotted rhythm, 2:1 shuffle rhythm, or 1:1?

Ohgushi's studies (2002 and 2006) pointed out the different tendencies of Japanese piano players with dotted rhythms. Japanese trained and professional pianists were reported to play dotted rhythm more closely to the written music score's 3:1 ratio than Western trained and professional pianists. In comparison, Japanese children who are taking music lessons have difficulty on producing the dotted rhythm. These findings suggest that the Japanese have a certain degree of difficulty with dotted rhythm. This

difficulty could have taken root before Japanese pianists even started their lessons during childhood, and originated with their experiences in music at that time, such as singing and playing rhythm. However, when we consider proficiency of singing “dotted rhythm”, we have to be careful with what nPVI indicates. A high nPVI value means a more random rhythmic behaviour. In the case of this song, it could imply two things, (1) singing in a random rhythm with no specific rules, (2) singing the dotted rhythm in a higher ratio with two of the pair of notes, and the length of the dotted eighth note made longer.

Consequently, ratios of tone length were examined to find out what was really going on while children were singing the song “If You’re Happy And You Know It”. Data were taken from 16 children for this analysis. The number of the children are listed below (Table 6.4).

	Japanese	English
3yo	2 (0 girls, 2 boys)	2 (1 girl, 1 boy)
4yo	3 (3 girls, 0 boy)	3 (2 girls, 1 boy)
5yo	3 (3 girls, 0 boy)	3 (3 girls, 0 boy)

Table 6.4 Number of children whose singing was used for ratio analysis on "If you’re happy and you know it”

In total, n = 55 sung phrases were collected for this analysis (16 children × 4 phrases) allowing for (9 ‘failure’ cases where notes were missing). The children’s singing were chosen because they could complete singing the whole first verse, and they had not been obstructed by the noise.

	3yo	4yo	5yo
ENG	1.39	1.74	1.81
JPN	1.71	1.1	1.31

Table 6.5 Mean length of the dotted note in “If you’re happy and you know it”

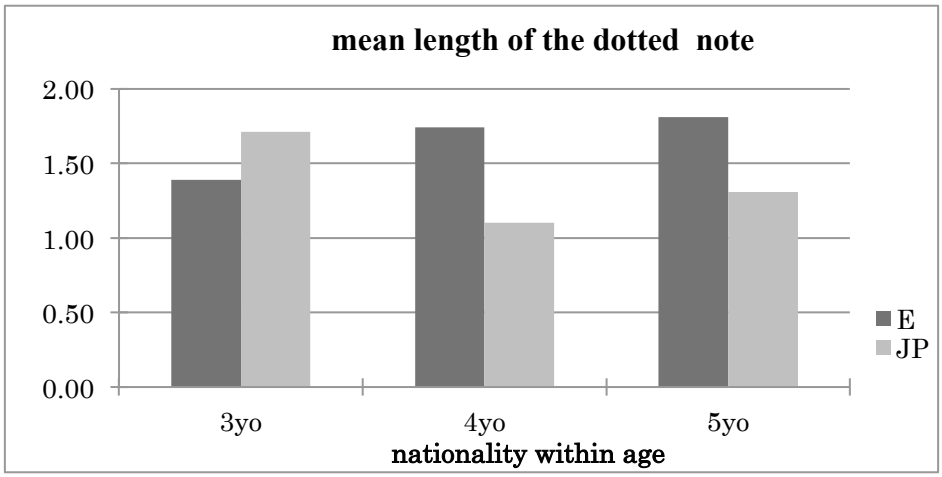


Figure 6.3 Mean length of the dotted note in “If You’re Happy And You Know It”

The differences were significant overall between Japanese and English (ENG vs. JPN: F (1) = 0.833, n.s.), nor significant among age groups (3yo vs. 4yo vs. 5yo: F (2) =0.091, n. s.). The data of the mean length od the dotted note show the ratio of two notes (dotted eighth note and following sixteenth note) is getting closer to 2 : 1 in older English children (Table 6.5, Figure 6.3). Therefore, it could be that their proficiency in singing dotted rhythms is also improving. They are not just singing the song in a random rhythm. In contrast, Japanese children appear to be shortening the longer note and moving more towards an equal-timed ‘mora-like’ response.

6.5 Summary of discussion

Difference in psychological tasks

To sum up, from the results of the "Twinkle, Twinkle, Little Star" analysis, it seems that the three year-old Japanese group had some difficulty with the psychological task compared with older children (Figure 5. 4). Although the rhythm seems to be not so much different from Japanese traditional children's play songs, *warabeuta*, the words of the lyric had to be lengthened to fit the melody. On the other hand, English children were found to cope better with the singing task because perhaps they were used to the same or similar kinesthetic (muscular movement) from speaking English, because of the similarity between speech and song in their culture.

In contrast, virtually all the children tended to have difficulty in singing the 3:1 dotted rhythm, although conversely, the Japanese three-year-olds were closest (Figure 5. 10). The song "If You're Happy And You Know It" (originally composed in Spanish) is a foreign song to both language groups, although the song is well-adapted as a familiar nursery song in both cultures.

Results from the nPVI analysis on language influences

Within the Japanese groups, there was a lowering of nPVI values between three year-olds and four year-olds in the singing of "Twinkle, Twinkle, Little Star", and particularly between four year-olds and five year-olds in "If You're Happy And You Know It". Overall, the English children were relatively consistent in singing "Twinkle, Twinkle" across age groups, but not completely in equal time, probably because of the linguistic demands of the lyrics requiring greater emphasis on the opening syllable. Participant Japanese children become much closer to the target as they got older. For the second song, "If You're Happy And You Know It", both nationalities sung with a bias

towards a ‘swing’ ratio of 2:1, which appears to be much more common in Western children’s songs than Japanese. The older Japanese age group had a bias in their vocal products towards a more even, ‘mora-like’ production, which again suggests that the underlying mother tongue is exerting a pressure towards the dominant traits of the language culture. There is also a caveat in this kind of fieldwork: there are challenges in finding equal recording environments for both groups and also similar numbers. It is recognized that the results are tempered by these research challenges. However, they appear to be support the hypothesis that children’s singing is influenced by their linguistic experiences.

Differences in language bring different tasks to children

A key difference in the tasks of this study, which children were asked to do for the recordings, was language. Singing in Japanese allowed Japanese singers to focus on placing the mora of the lyrics into exact musical timing, because the Japanese language rhythm and the Western music rhythm, are of a different nature. Therefore, the Japanese children’s task in singing was to bring the bias in their spoken language to the musical task, which required an equal rhythmic ratio of 1:1. On the other hand, singing in English allowed English singers to focus on the lyric and the language itself, which is reflected in their relative inaccuracy in strict 1:1 ratio terms in musical notation.

When we take a closer look at the difference between the Japanese and English languages, the difference of the minimal pronounceable unit seems to be the key for further understanding. As Japanese is a mora-timed language, a musical note is filled by one mora in Japanese songs generally. In English songs, the syllable is the unit for one music tone, not a mora. This is an underlying difference for the children, as they move from one musical tone to the following music tone. For example, singing “Twinkle,

Twinkle, Little Star" in Japanese, the task is focused on keeping the same length of musical tones to keep the equal-timed rhythm. On the other hand, singing the same song in English, filling it with heavy syllables from one tone to the following tone becomes a focus for the task.

Perhaps because of this underlying difference, the unstable rhythm exhibited by the three year-old Japanese group's singing can be hypothesized to becomes more accurate and move towards equal-timed rhythm in the older age groups. For the English groups, the focus is on the underlying bias in the syllable-timed text, which is not equal in the language rhythm.

Chapter 7 nPVI Analyses of Example Songs for Young Children in Japanese and English songbooks

7.1 Background

Children's songs are likely to contain many of the musical characteristics of their mother culture. For example, Koizumi (1984) stated that all the basic factors of traditional Japanese adults' music could be seen in *warabeuta*, which are Japanese children's game songs. He analysed these songs and reported important features that distinguish the fundamental characteristics of rhythm in Japanese traditional music, which can be used to predict the rhythmic organisation underlying various genres of traditional Japanese sung music. Koizumi (op.cit.) suggested that there were many children's songs in which the musical rhythm was emphasized by the underlying characteristics of the language rhythm. Rhymed verses that were typical in Nursery rhymes were also found in *warabeuta*. He believed that the underlying association between language rhythms and rhyming were used to enable the song's musical rhythms to be more attractive for children and even adults. Washizu (1997) observed English children playing games with songs and analysed the songs in comparison with Japanese children's game songs and *warabeuta*. One of the conclusions from her analysis was that children's songs contain what she termed as a 'language-rhythm' and 'language-melody line' in both Japanese and English cultures (Washizu, op,cit., p.13.). She suggested that children acquire their culture's preferred musical rhythms and the rhythms of their mother tongue by repeated singing of these songs while they play games. Body movement and rhymes in songs come together to demonstrate the cultural impact on music rhythm. Nevertheless, so far, most of the research seeking to establish

a language-music relationship has been undertaken on composition and performance in adults (Patel & Daniele, 2003; Sadakata 2004, 2006).

Rhythm is considered to be one of the basic features of young children's production of music. For example, Umemoto and Iwabuki's (1990) study of children's composing found that rhythm was the first structure to emerge and, therefore, to have prominence in children's song composition tasks. It is possible to conceive, for example, that, for Japanese children, when a verse was uttered with a certain rhythm, it became a song even in the absence of a melody line. The researchers also found that children often had a favourite rhythm that was used for composition tasks, suggesting that children's familiarity with their favourite rhythm derived from the popular children's songs with which they were brought up.

However, there is little evidence of rhythm-focused research on children's songs that have focused on rhythmic aspects, although there are many research studies on children's songs. Most of these Japanese studies have focused on the collection of *warabeuta* songs (Koizumi 1984, 1986; Kojima 1999; Iwai 1998; Maebara 2006; Sugimoto 2008) and also on how to make the best use of such songs in music education (Koizumi 1982; Omi 2001; Kojima 2009; Wada 2008; Onishi 1997; Sakai, 2010). An exception is research by mentioned earlier Koizumi (1984) on children's songs with a major focus on rhythmic aspects. But, across all the studies, an applied quantitative approach (such as employed in this thesis) was not evidenced in past studies.

Within the focus for this thesis, the technique reported in studies by Patel and Daniele (2003) and Sadakata et. al. (2004, 2005) – nPVI analysis – was applied to investigate the correspondence between the rhythm of children's published songs and the rhythm of their mother tongue. The findings reported below from song publications were compared with nPVI values of the actual timing in children singing in Japanese

and in English songs (see Chapters 5 and 6) in order to explore any possible language influences on children's musical development.

7.2 Aims

The printed musical scores (written music) of Japanese and English children's songs are the focus of this chapter's analysis, not the actual timing of children's singing. The aim is to examine any possible similarity or difference in the rhythmic characteristics between children's published song music and children's language rhythms. From an analysis of the printed music score, we can examine an adult conception of what sort of music rhythm is perceived to be suitable for young children in each culture. It can be argued that children who were brought up with these songs will acquire the rhythmic patterns of these songs in order to be able to reproduce the cultural music style. Published Japanese and English songs were selected so as to explore any cultural differences in their modelling in relation to the other fieldwork of children's singing from these two language groups, as reported in the previous chapters.

7.3 Method

An identical nPVI analysis approach was undertaken on example publications of Japanese and English children's songs (see Chapter 2 for details of nPVI). The same method was used as in Sadakata's (2004) and Patel & Daniele's studies (2003).

7.3.1 Song materials

Song materials for analysis were taken from two children's song books: *Kodomonouta 200* (Kobayashi, 1975) for Japanese songs, and *The Big Book of Nursery Rhymes and Children's Songs* (Amsco Publications, 2004) for English songs. *Kodomonouta 200* contains two hundred children's songs, which are commonly found in nurseries and kindergarten in Japan. The collection is widely used on university teacher training courses and, consequently, in kindergartens in Japan. Most of the songs in this book are based on original versions (from Japan and elsewhere), and not on special arrangements as modernized versions. The majority of the songs were composed by Japanese composers. A few other songs are of foreign origin and arranged by Japanese composers. Here the song lyrics have been translated into Japanese from the originals. The genres of the songs vary and include *warabeuta*, *doyo*, and *shoka*.

Figure 7.1 The children's song books used for the nPVI analysis. The Japanese song book '*Kodomonouta 200'* and '*The Big Book of Nursery Rhymes and Children's Songs*'

The Big Book for Nursery Rhymes and Children's Songs contains 169 in English songs, which are reported by the publisher to be all-time favourites for children. They also vary in genres and include nursery rhymes, folk music, and traditional game songs.

From these two sources, 75 Japanese and 67 English children's songs were chosen. The songs which were included for analysis were selected after comparing the contents of these two collections with those published elsewhere, i.e. occurring in at least three out of four other books of Japanese songs and three out of six English song selections (see Table 7.1 below). This enabled the final song choices to be widely representative of the two cultures. The numbers of books for comparison were different between Japanese and English because the number of songs contained in any one book was larger in the Japanese song books. The selection rule was designed to pick commonly sung, familiar songs among children and caregivers working in a nursery environment. The list of song books used for this procedure was as follows.

Japanese books
- *Kodomono uta 200*. 1975. Kobayashi. Chairudosha. [こどものうた２００．小林美実．チャイルド社]
- *Nihon doyo meikyokushu*. 2006 (first published 1997). Nagata. Zenonshuppan. [日本童謡名曲集．長田暁二．全音楽譜出版]
- *Nihon doyo kasho zenshu*. 2002 (first published 1984). Doremishuppan. [日本童謡唱歌全集．ドレミ楽譜出版].
- *Kodomonouta daizenshu*. 2007. Kataoka. K. M. P. [子どものうた大全集．片岡博久ケイ・エム・ピー]

English books
- *The Big Book for Nursery Rhymes and Children's Songs*. 2004. Amsco Publications
- *The Kingfisher Nursery Rhyme Songbook*. 1995. Emerson. Kingfisher
- *Sing Hey Diddle Diddle*. 1991. Harrop. A & C Black
- *This Little Puffin*. 1991 (first published 1969). Matterson. Penguin Books
- *Great Song Book*. 1978. Timothy. Doubleday
- *The Faber Book of Nursery Songs*. 1968. Mitchell. Faber & Faber

Table 7.1 A list of song books which were used for choosing song materials for the analysis

In total, 182 phrases from Japanese and 124 phrases from English songs were collected for nPVI analysis (see Table 7.2). In each case, the first verse was targeted for analysis because it was considered to be more well-known than the other verses, and also to avoid any slight differences in rhythm used in the following verses. Phrases which were shorter than 12 notes were eliminated in order to apply the same approach used in the previous researches of nPVI analysis by Patel and Daniele (2003) and Sadakata et. al. (2004).

	Japanese	English
songs	75	67
phrases	182	124

Table 7.2 The numbers of songs and phrases chosen from Japanese and English children's song books for the analysis

7.3.2 nPVI (normalized Pairwise Variability Index) analyses

The nPVI values were calculated for each phrase for a comparison of the relationship between the language and music rhythm between Japanese and English. The nPVI analysis was employed in Patel and Daniele's (2003) study to investigate the relevance between language and music. As mentioned in chapter 2, it was first introduced into linguistic studies by Grabe and Low (2002) as a new solution for mapping the underlying rhythmic typology of languages. The nPVI approach was used to allow previously unclassified languages to be more easily differentiated in rhythmic typology, and also to make the difference clearer between classic rhythm groups such as stress-timed, syllable-timed and mora-timed languages.

Huron et. al. (2006) extended Patel and Daniel's study (2003) with a larger data set. Their findings confirmed that nPVI was an appropriate tool to use on music for seeking the language and music relationship of rhythm. Sadakata et. al. (2004; Sadakata 2006) also applied nPVI analysis in a cross-cultural study of the rhythms used for pop music. They found the same relationship between rhythm in pop music with English lyrics and English language, and Japanese lyrics and Japanese. Thus, it was concluded that musical compositions, to a certain degree, were influenced by the language that was used for the lyrics, or the composer's mother tongue.

The nPVI measures provide an index to show how random the lengths of successive tones are. It shows variation in the lengths of the successive tones as numbers. The nPVI score can vary from 0 to 200. An nPVI value of 0 means a succession of identical length tones. An nPVI value 200 indicates that the lengths of successive tones are various and without obvious regularity in their patterning. The nPVI value will be a larger number when the lengths of tones next to each other are very different. It will be a small number when the length of tones next to each other are

the same. The nPVI values from previous literature studies are listed in the table above (Table 7.3).

French language = 43.5 (Grabe & Low, 2003)	>	French composer's classical music = 40.9 (Patel & Daniel, 2003)
English language = 57.2 (Grabe & Low, 2003)	>	English composer's classical music = 46.91 (Patel & Daniel, 2003)
	>	pop music with English lyrics = 51.4 (Sadakata, 2006)
	>	pop music with English lyrics refrain part = 54.7 (Sadakata, 2006)
Japanese language = 40.9 (Grabe & Low, 2003)	<	pop music with Japanese lyrics = 50.6 (Sadakata,
	<	2006)
		pop music with Japanese lyrics refrain part = 49.7 (Sadakata, 2006)

Table 7.3 The nPVI values from previous studies (see text)

Language nPVI values reported by Grabe and Low (2003) were: British English= 57.2, French= 43.5, and Japanese= 40.9. Music nPVI values by Patel and Daniele (2003) were: Classical music by English composers= 46.91, and Classical music by French composers= 40.90. Music nPVI values reported by Sadakata et. al. (2004) were: pop music with English lyrics= 51.4 (refrain part only= 54.7), pop music with Japanese lyrics= 50.6 (refrain part only= 49.7).

In general, as can be seen in Table 7. 3, it would seem that language nPVI values were larger than those for the music in each language. An exception was found only in the case of Japanese. nPVI values of pop music were larger than that for the language. In other words, the rhythm is more variable in speech than in sung music in Western cultures (as exampled in French and in English). However, the varied rhythm of speech becomes a more settled/fixed rhythm when it is sung as lyrics with musical beats and underlying pulse. The musical metre which is often a repeating fixed form of

beats in Western style music allows the varied rhythm of speech to fit into a more settled rhythmic pattern. Meanwhile, in Japanese culture, the speaking rhythm is typically more fixed and equal-timed (mora-based) than that of music. The equal-timed speech rhythm of Japanese language becomes a more varied rhythm in singing. It must be emphasized that contemporary songs in Japanese culture are often designed as Western style music with Japanese lyrics. The relationship between rhythmic characters of speaking and singing appear to change in opposite directions between Western (e.g. English) and Japanese cultures (as illustrated in Figure 7.2).

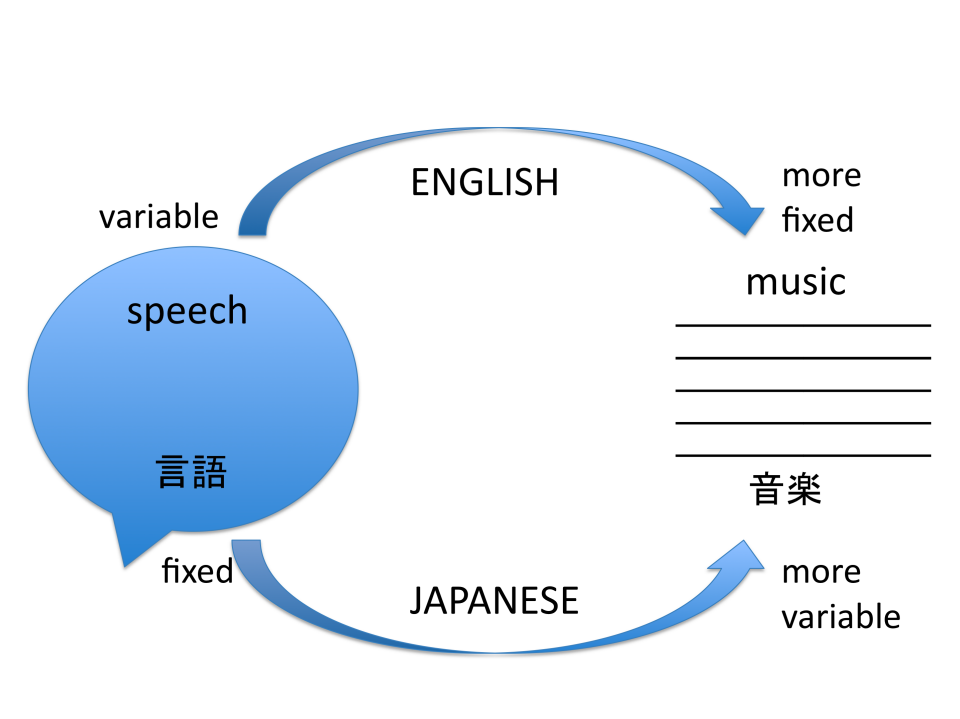


Figure 7.2 Difference between English and Japanese rhythmic characters in speech and music

In Western culture, for example, in English, a relatively varied rhythm in speech turns into a more fixed rhythm in singing. In contrast, in Japanese culture, the relatively fixed rhythm in speech changes into more varied rhythms in singing. For

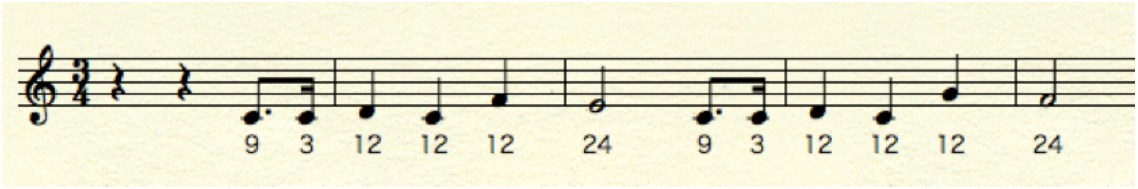
Western people, it could be inferred that uttering words in a more fixed rhythm on musical beats minimizes the freedoms of its rhythm. On the other hand, in Japanese, the rhythm can be explored with greater variation in singing than speaking. These cultural differences could influence the acquisition of singing and speaking rhythms of Japanese and English children in different ways.

7.3.3 How nPVI was calculated

The length of each music note was provided, as in a list below, to generate the IOI (inter-onset-intervals) from the music scores. For example, the length of a whole note (semi-breve) was given as 48 (Figure 7.3).

Figure 7.3 A list of the numbers applied to each music note (Patel and Daniele, 2003)

These numbers were applied to each of the music notes in the selected song phrases. Each phrase was turned into successive numbers of IOIs. These sequences of numbers were put into an nPVI equation to calculate the nPVI value of each phrase, which was introduced in a language typology study by Grabe and Low (2003, see Figures 7.4 and 7.5).



↓

phrase: 9, 3, 12, 12, 12, 24, 9, 3, 12, 12, 12, 24

Figure 7.4 An example of the way that the lengths of music notes were applied to a phrase to get successive numbers of IOI

$$nPVI = 100 \times \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| /(m-1) \right]$$

Figure 7.5 Equation for nPVI (Grabe & Low, 2003)

In this process, notes longer than one bar were eliminated, and phrases shorter than 12 notes were eliminated to follow the same procedure as reported in previous studies.

One difference in the method used in this study from former researches was the means of applying the assigned numbers for IOIs. Sadakata had set the number 48 as the length of one bar, not to a whole note (semi-breve) itself, although it equals to a whole note (semi-breve) in 4/4 metre. The material for her analysis was pop music, which was written in 4/4 or 2/4 metre; therefore, it was not necessary in her study to consider musical cases in a different metre. In this study, the number 48 was set as the length of the note, for consideration of metre change within a song. The same length is

kept for the same musical notes usually after a metre change, (e.g. the same length was applied to quarter notes (crochets) before and after a metre change in a song).

7.4 Results

7.4.1 Main finding

A significant difference was found between Japanese and English children's printed songs' mean nPVI values (Mann-Whitney U = 8690.500, p< 0.001). The mean nPVI value was significantly higher in Japanese songs (JPN 79.21, ENG 64.6) (Table 7.4 and Figure 7.6).

language	Mean nPVI	N	Std. Deviation
English	64.5892	124	43.80843
Japanese	79.2066	182	41.92626

Mann-Whitney U=8690.500; Asymp. Sig. (2-tailed) = .001

Table 7.4 Mean nPVI values of English and Japanese phrases of example printed children's music

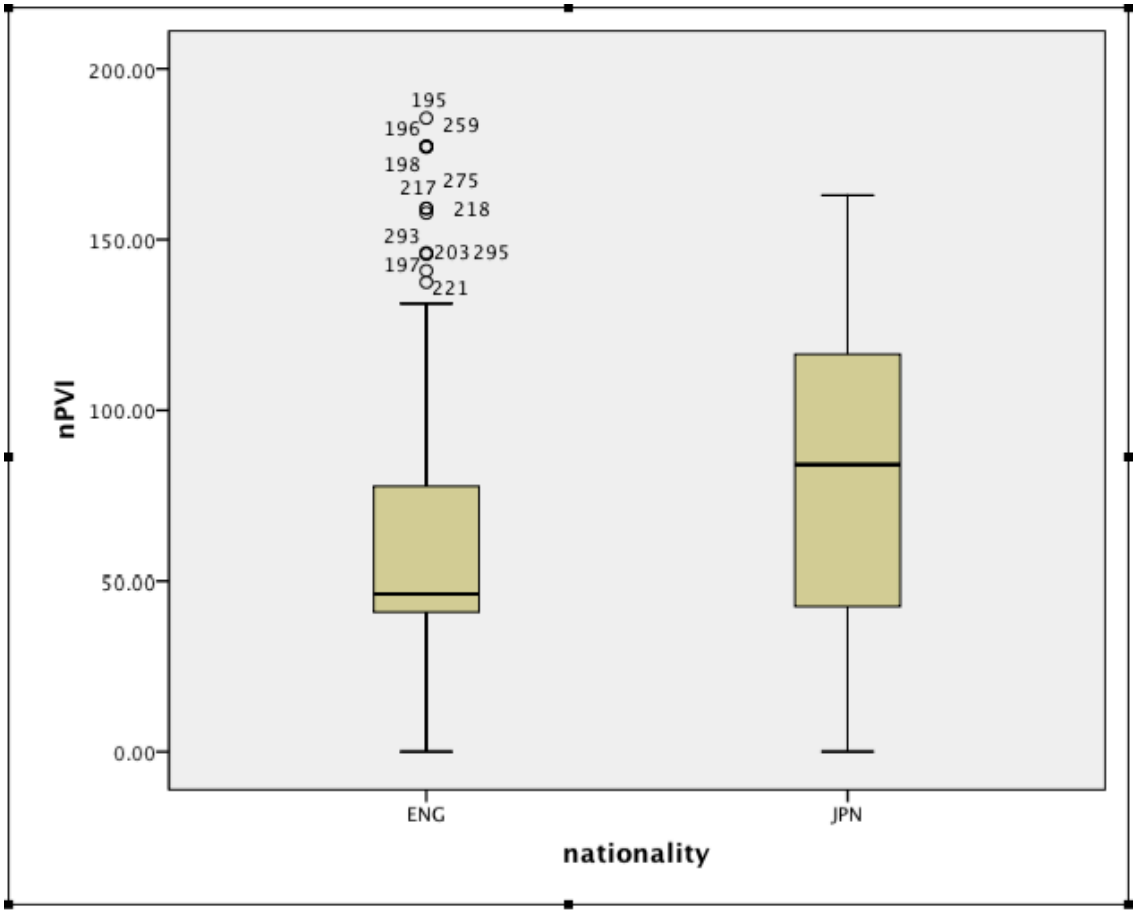


Figure 7.6 nPVI box plots for English and Japanese children's song phrases

This result was in contradiction to the nPVI values reported in previous researches found between Japanese and English languages. In previous researches, all the nPVI values were higher for English than Japanese examples, including as language (JPN 40.9 < ENG 57.2) (Grabe & Law, 2002), popular music (JPN 50.6 < ENG 51.4) (Sadakata et. al., 2005), and popular music refrain parts (JPN 49.7 < ENG 54.7) (Sadakata et. al., 2005). However, children's songs mean nPVI values in this new data analysis were significantly higher in Japanese than English (JPN 79.21 > ENG 64.6). This was unlike the results from other researches. Musical nPVI values were usually lower than those for language samples in previous researches, but these had been focused on adult music not children's music.

Another difference from the previous researches was that the children's songs mean nPVI values were higher than that of the language in both languages (JPN Children's songs 79.21 > JPN language 40.9, ENG Children's songs 64.6 > English language 57.2, see details in Figure 7. 7). In the previous studies, the nPVI values were higher for the language than adults' music (language nPVI ＞ music nPVI). It could be said that the rhythmic tendency in (published) children's music is very different compared to that for adults' music in both Japanese and English cultures.

It is clear from the figure 7. 7 that the nPVI value of Japanese children's children printed songs was distinctively higher than for the others. Two tendencies can be seen from the results. One is that Japanese groups have an opposite relationship between language nPVI and music nPVI (the music nPVIs were higher than language nPVI) compared to other studies, where music nPVIs were lower than that of the language. This seems plausible because of the nature of metre in music. The fixed structure of the metre/beat in music requires the length of notes to be in some sort of regulation, and it allowed nPVI values lower than the non-structured speaking language nPVI. However, the rhythm patterns in the focus children's songs were more varied than those for the language rhythm in both English and Japanese.

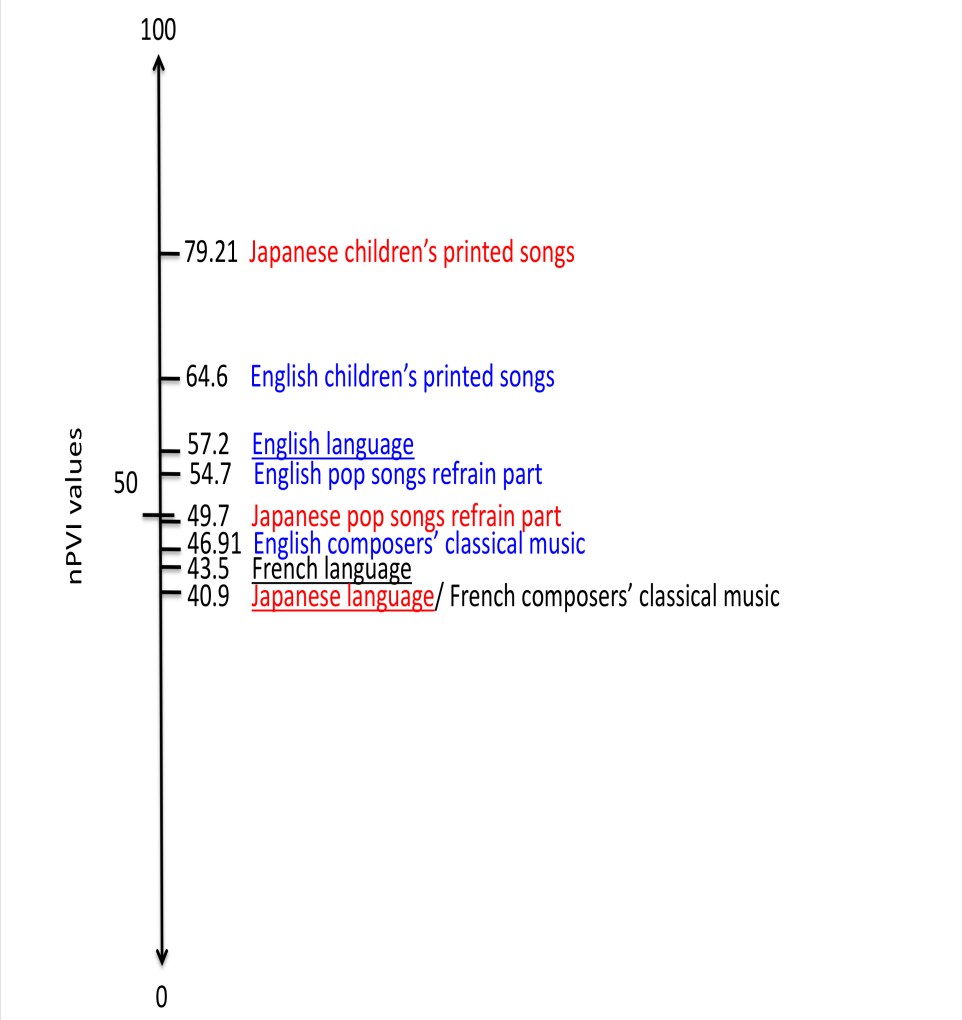


Figure 7.7 nPVI values on 0-100 scale (synthesized from Patel & Daniel, 2003; Sadakata et. al., 2005; Grabe & Law 2002, and the results of the analysis of this study)

Another tendency is that nPVI values for children's songs were the highest in both Japanese and English. This implies that rhythmic variety is characteristic of children's printed song material and more varied than the underlying language rhythms.

To sum up, the results imply that: (1) there was common tendency in both Japanese and English cultures for children's songs rhythm to be very different

compared to the music for adults; (2) the underlying reported bias in the language rhythm was not reflected in the children's song rhythms. Especially in Japanese, there was a large gap between the Japanese language rhythm and children's songs nPVI values (Japanese language 40.9 < Japanese children's printed songs 79.21).

7.4.2 Further analysis: duplet and triple division rhythm

The Japanese children's printed songs' nPVI value of 79.21 was much higher than the other values reported for other genres of music and language (see Figure 7. 7). This value suggests that, for Japanese young children, the difference between language rhythm and songs is very different, although it has been said that the boundary between speaking and singing is not clear for babies (Masataka, 1993), and that young children often enjoy word play, naturally improvising songs from repeating words (Ogura, 2005). Consequently, further analysis was carried out, (1) to seek the reason for the high nPVI value of children's printed songs, especially Japanese, and (2) to understand what made the contradicted nPVI values between the two sets of language songs.

At the start of the further analyses, the focus was on rhythm types based on metre structure of the children's printed songs, the origins of the song, and the lyric's language. As was explained in Chapter 2, the rhythmic structure of Japanese traditional children's songs is very different from that in Western music. For example, according to Koizumi's study on Japanese music rhythm (1984), triple division rhythm does not exist in *warabeuta*: traditional children's game songs. Therefore, a lack of familiarity with triple division rhythm (for example, rhythms in 3/4 and 6/8 metre) in Japanese children can be expected. Koizumi also stated that the fundamental rhythmic structure of *warabeuta* is two-beat metre, which can be written as duple rhythm in a music score as

in 2/4 or 4/4 metre. He also suggested that a bouncing rhythm (dotted rhythm, e. g. a pair of dotted eighth notes (quarvers) and a sixteenth note (semiquaver)) only occurred when the song was sung with a physical bouncing motion, or the lyric contained weakened-mora, which caused an irregular rhythm in the song language. The Japanese language is classified as being based on a mora-timed rhythm. This means the each mora, the phonetic sound, is pronounced in a equal-timed rhythm and which can be written as successive eighth notes (quavers) in a music score. Koizumi suggested that the rhythm in *warabeuta* is also based on Japanese language rhythms. Therefore, it might be expected for the rhythm in Japanese children's printed music to also be based on an equal-timed Japanese language rhythm, which is written as duple rhythm in 2/4 or 4/4 metre on a music score. Triple rhythm, which does not exist in *warabeuta*, according to Koizumi, is found in 3/4 and 6/8 metre. The 3/4 metre is used for dance music such as a western waltz. The 6/8 metre is repeatedly used for lullabies, and blues in English nursery songs (ibid).

For the further analysis, all the phrases of the Japanese and English children's printed songs nPVI values were classified into two rhythm types, being either duple (2/2, 2/4, 4/4) or triple divisions (3/4, 6/8) for analysis. Mean nPVI values, the numbers of phrases involved in the analyses and standard deviations of each rhythmic type by languages are listed in table 7. 5.

From the results (table 7. 5), Japanese nPVI values of both rhythm types are higher than English (JPN 89.06 > ENG 81.36 in triple). The triple division rhythms' (3/4 and 6/8 metre) indicated that nPVI values were higher than duple division rhythms (2/2, 2/4, and 4/4 metre) in both languages. This implies that there were differences in tone lengths which were next to each other in triple division rhythm. Therefore, it could be that a rhythm pattern of 2 : 1 or 1 : 2 ratio note pairs (for example, a eighth note/quaver

followed by a sixteenth note/semiquaver and vice versa) pushed up the nPVI values in triple time. On the other hand in duple rhythm, Japanese children's songs' nPVI values were much higher than English (JPN 77.78 > ENG 70.54 in duple) (see Table 7. 6). All of the nPVI values were higher than the music nPVI values reported in previous researches.

nPVI

Nationality	Mean	N	Std. Deviation
ENG duple	53.86	69	29.25
triple	78.06	55	54.43
Total	64.59	124	43.81
JPN duple	77.78	159	44.2
triple	89.06	23	17.66
Total	79.21	182	41.93
Total duple	70.54	228	41.69
triple	81.3	78	46.82
Total	73.28	306	43.23

Table 7.5 mean nPVI values, numbers of phrases, and standard deviations per rhythm type: duple (2/2, 2/4, 4/4) and triple (3/4, 6/8)

	duplet 2/2, 2/4, 4/4	triplet 3/4, 6/8	total
Japanese	77.78 (87%)	89.06 (13%)	79.21
English	70.54 (56%)	81.30 (44%)	64.59

Table 7.6 mean nPVI values and ratios for duple and triple division rhythm in Japanese and English

The ratio of duple division rhythms was very high in Japanese songs (87%).

7.4.3 Influence of foreign origin songs

A consideration was made for songs of foreign origin possibly influencing the data. Although there were not so many foreign songs included in both the Japanese and English selected songbooks, there were significant numbers.

Overall, 21 out of 75 songs with Japanese lyrics were of foreign origin. Other Japanese lyric songs were also defined by genre, such as Doyo, Shoka, and *Warabeuta*. Most of the songs were Doyo, which were composed for children's singing outside school. Shoka, which were composed as children's music in school were much fewer by comparison than the Doyo songs. Only one *warabeuta* song, the most authentic Japanese children's song in this selection, was found among the 75 selected songs (see Figure 7.8).

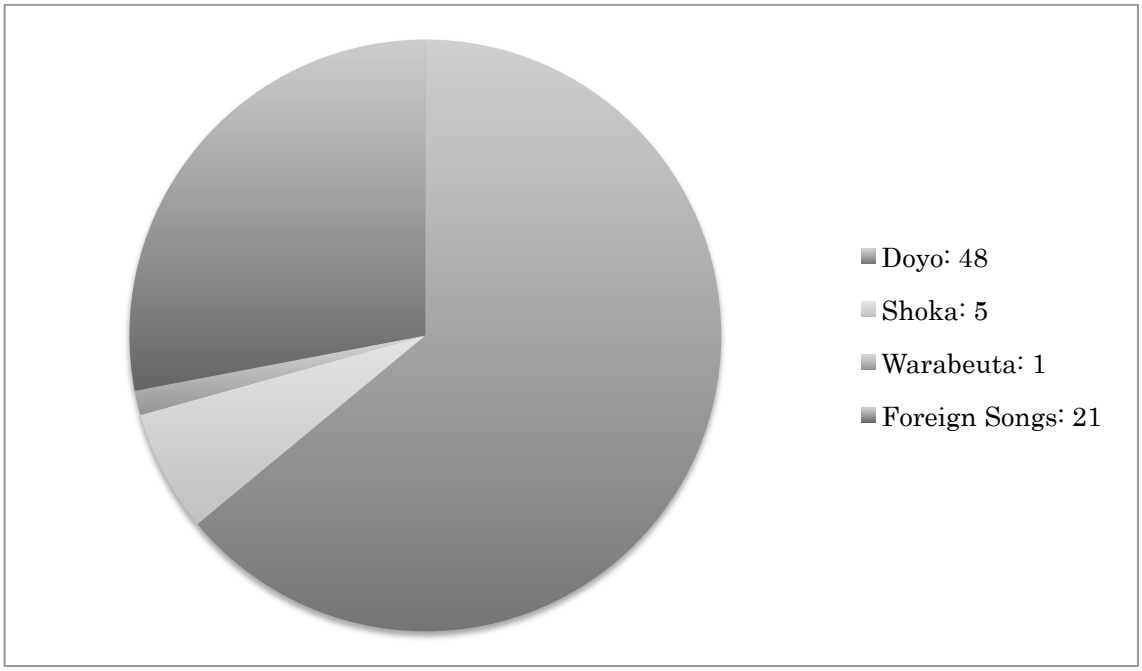


Figure 7.8 Numbers of songs by genre with Japanese lyrics

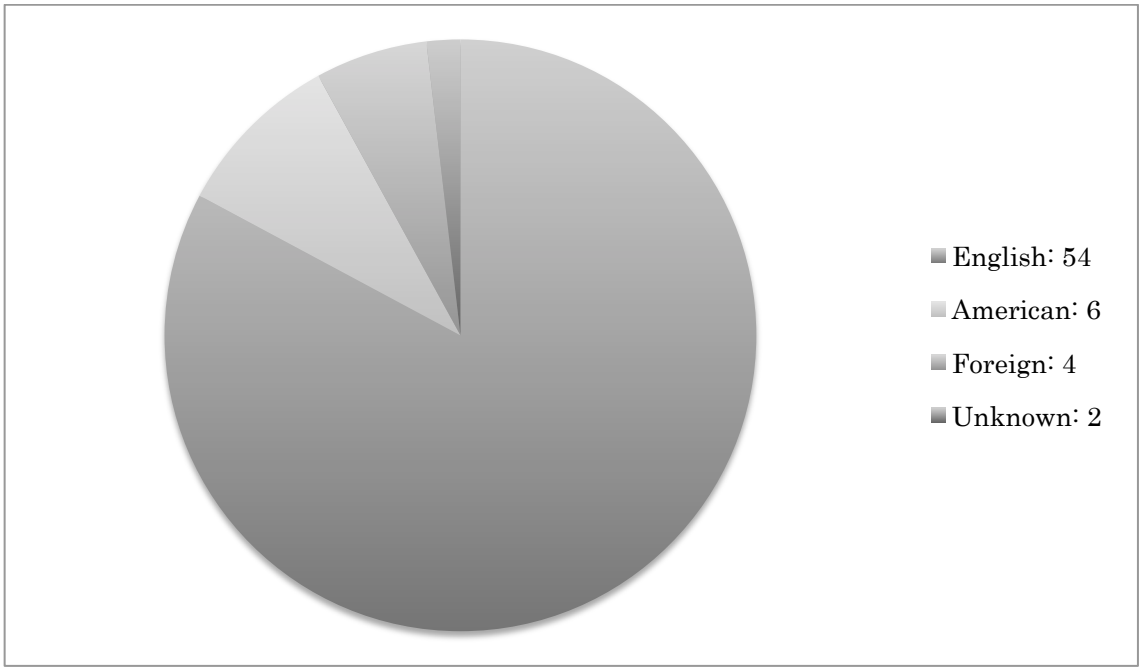


Figure 7.9 Numbers of songs by origin with English lyrics

In contrast, songs originally written in a foreign language counted for only 4 out of 66 amongst the selected English lyric songs. English songbooks contain a very high ratio of original English nursery rhymes and English songs (figure 7. 9). A Mann-Whitney U test was carried out on nPVI values of these songs, with the songs of foreign origin eliminated. The songs were divided into three song groups, 0 = English origin and English lyrics songs, 1= foreign origin and Japanese lyric songs, and 2 = Japanese origin and Japanese lyric songs.

Mann-Whitney Test

Ranks

	0...	N	Mean Rank	Sum of Ranks
nPVI	0	115	112.28	12912.00
	2	133	135.07	17964.00
	Total	248		

Test Statistics

	nPVI
Mann-Whitney U	6242.000
Wilcoxon W	12912.000
Z	-2.495
Asymp. Sig. (2-tailed)	.013

a. Grouping Variable: 0=England, 1=foreign, 2=Japanese

Table 7.7 Result of Mann-Whitney test on nPVI values by song origin and lyrics' language

A significant difference was found between song groups 0 = English origin and lyric, and 2 = Japanese origin and lyric (Mann-Whitney U Test, Asymp, Sig. = .013).

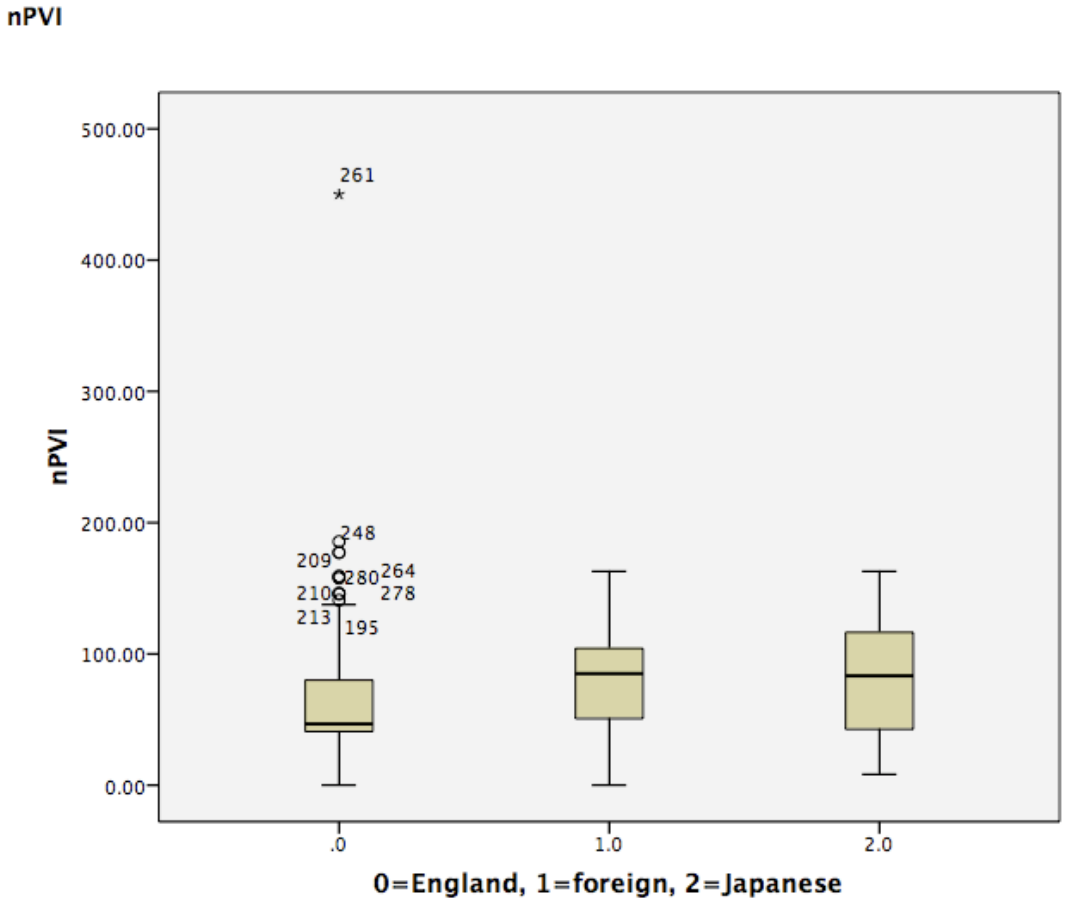


Figure 7.10 Box plots of nPVI values by song origin and lyrics' language

From the box plots in figure 7. 10 above, the difference in song groups between 1 = foreign origin and Japanese lyric, and 2 = Japanese origin and lyric can seem to be small. It could be because of the transition of music notation and rhythm which occurs in the translation of the lyrics. Singing the melody in Japanese words may force the original rhythm to change into a Japanized rhythmic pattern.

7.5 Discussion

Higher nPVI values were found in both Japanese and English songs in contrast to the reported values for language rhythm. However, this was not due to the influence of the different ratios of rhythm types (duple and triple rhythm) used for children's songs in the two song collections. For example, 87% of the songs in Japanese were duple division rhythm. Although this is a high percentage, it did not make the mean music nPVI value of Japanese children's songs lower. Higher nPVI values were found in the duple rhythm category, as well as in the triple one. This suggests that the underlying reason why the music nPVI is higher in Japanese is the wide use of varied rhythms in the music notation.

For the use of different rhythms it could relate to the influence of the most favourite rhythm in Japanese songs. Dotted rhythms, especially the repetition of dotted eight notes/quavers followed by a sixteenth note/semiquavers (see figure 7. 9 below, This is called [タッカのリズム takka no rhythm] in Japanese) were often found in duplet division rhythm songs.

Figure 7.11 Successive dotted rhythm are often found in Japanese children's songs

This repeated 3:1 IOI ratio rhythm makes the nPVI value higher. However, this successive dotted rhythmic pattern was not much evidenced in English children's songs.

In triple division songs, another favourite rhythmic pattern(s) among Japanese children's song was found (see7. 12).

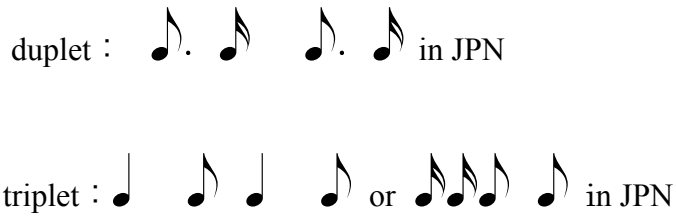


Figure 7.12 Possible favourite rhythm patterns in Japanese children's songs in duple and triple division rhythms

Another reason could be a difference in thinking regarding musical notation. For example, "If You're Happy and You Know It" is not always written in an identical notation in English songbooks. However, it is always written in successive dotted rhythm in Japanese music scores. The same notation (as it occurs in Japanese song books) can sometimes be found in English versions, but it is more often found written in successive eighth notes with a 'swing' rhythm indication on top (see Figure 7. 13 below and the example in 7. 14).

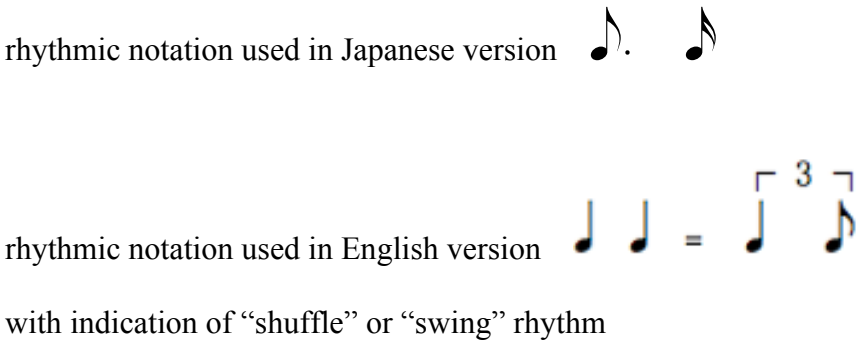


Figure 7.13 different notations of "If You're Happy and You Know It"

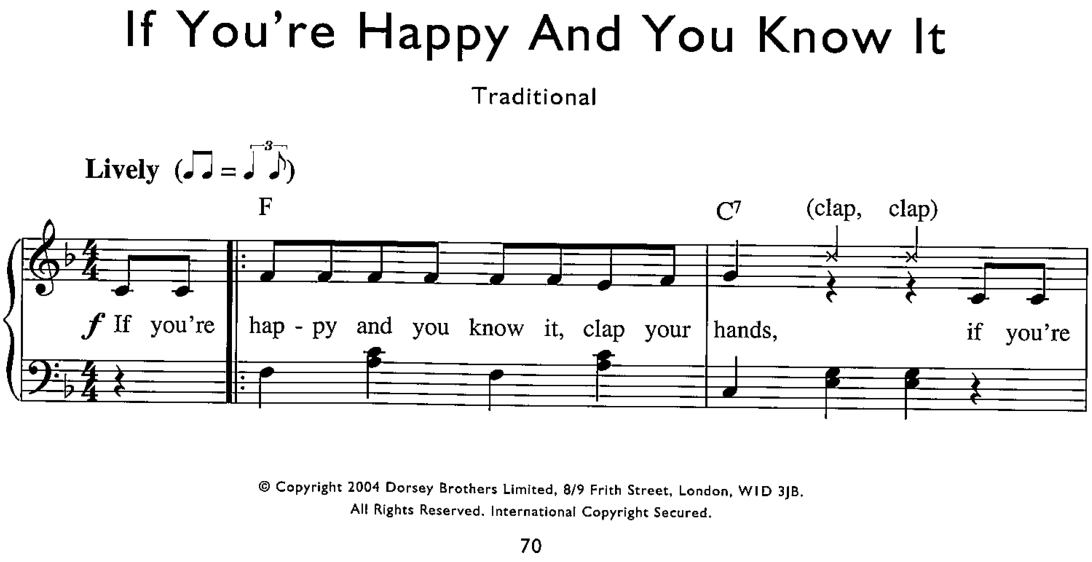


Figure 7.14 The beginning of an English music score: 'If You're Happy And You Know It' from a song book: "The Big Book of Nursery Rhymes & Children's Songs" with the implied triplet rhythms of performance.

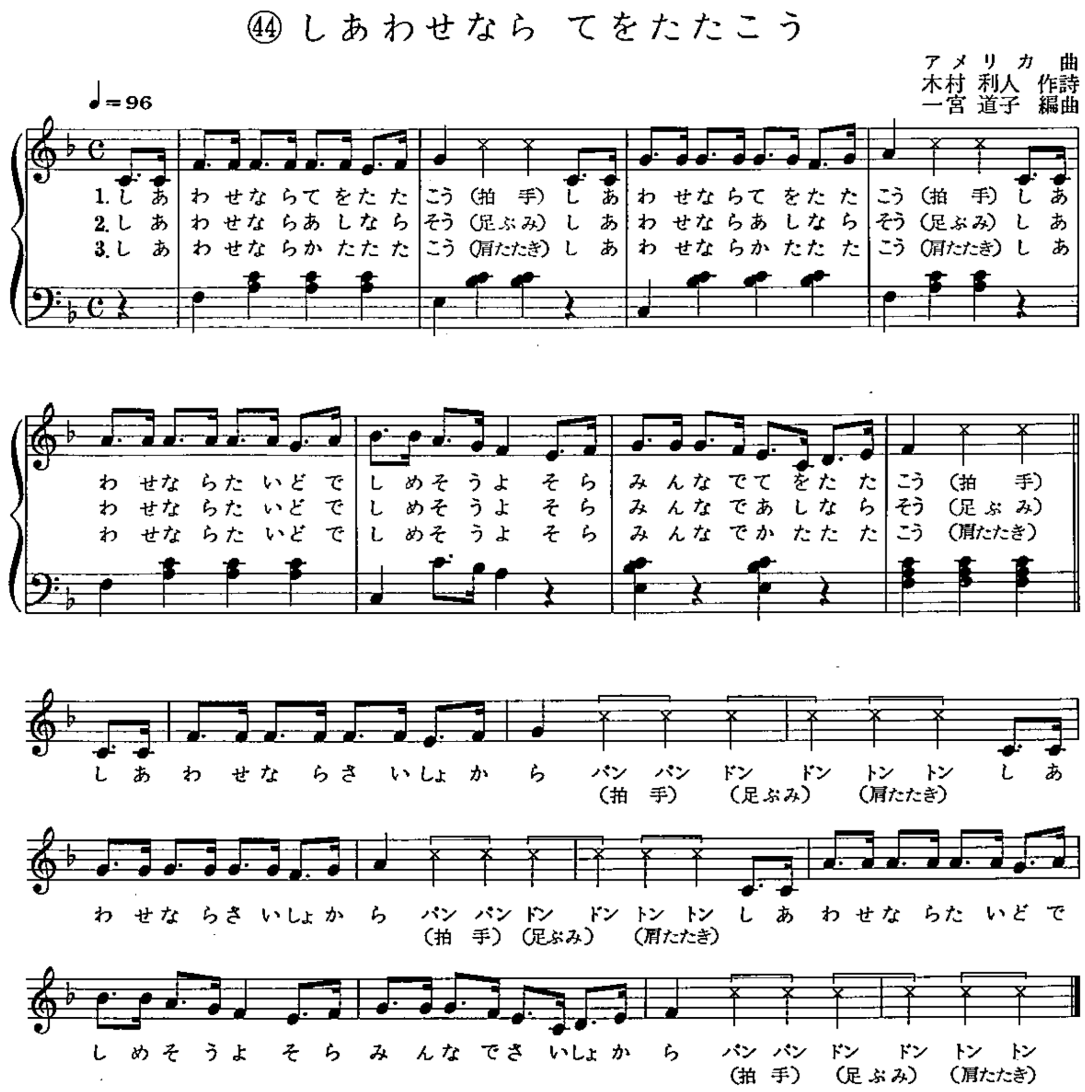


Figure 7.15 Japanese music score: 'If You're Happy And You Know It' from a song book: "Kodomonouta 200".

A reason for having different ways of music notation was offered by Koizumi (1984). He explained this perception of the differences in basic ideas of rhythm and metre between Japanese and Western music. He stated that bouncing rhythm is only found in songs which are sung with a bouncing body movement, which are commonly songs used in games, or songs which contain lyrics with weakened mora. The bouncing rhythm of these were usually sung in a 2:1 ratio, but written as successive eighth notes

in the music score. The reasons, Koizumi explained, were that the bouncing rhythm was an irregular case, and the idea of a pair of two beats (omote-haku, ura-haku) dominated in traditional Japanese music. Therefore, basic music scores were written in duple division rhythm/metre, not in triple, and often irregular rhythms were not written precisely in scores. However, most *warabeuta* are children's game songs and these are sung with a bouncing body motion. This explains the dotted rhythm often found in many Japanese children's songs including traditional ones. By following tradition, the dotted rhythm is believed to have become a favourite among children and it seems by implication to have made the nPVI value of Japanese children's songs higher.

7.5.1 Differences in rhythmic emphasis in songs for young children

nPVI values in both Japanese and English children's songs were much higher than the other nPVI values from past studies. This implies that more a 'rhythmical' or bouncing rhythm is used in young children's songs than in adults' music. Especially in nPVI measurement, the value will be higher in cases where the length of musical notes next to each other is large. It means that the rhythmic character of songs and speech for children are quite different. Therefore, it can be concluded that, for children, a 'singing' task is very different than 'speaking' in terms of underlying rhythm. Singing requires the task to involve uttering lyric words to a fixed rhythm pattern and metre.

7.5.2 The unique circumstance of Japanese children's songs

The nPVI values are usually higher in English than Japanese (such as in language nPVI), in songs for adults, but not in the case of children's songs (Grabe & Law 2002; Sadakata, 2005).

nPVI values

language: English > Japanese

pop songs (for adults): English > Japanese

Children's songs: Japanese > English

Figure 7.16 Psychological task for English children

All the nPVI values from past studies report a similar finding in the nPVI difference between language and music, such as in the studies which analyzed non-lyric music by Patel (2003) et. al. and Hullon (2006). The French language nPVI value was lower than English, and the French composer's classical instrumental music nPVI value was lower as well, compared to that for English composer. Sadakata's data (2005) reported no difference in nPVI values between Japanese and English pop song lyric, though she reported a corresponding relationship between language rhythm in the refrain parts, between Japanese and English pop song lyrics. However, in the case of Japanese children's songs reported here, the difference from the language nPVI was especially large. The difference was 38.31 (Japanese language mean nPVI = 40.9, Japanese children's songs mean nPVI = 79.21), while the difference of language and children's songs in English was only 7.4 (English language mean nPVI = 57.2, English children's songs mean nPVI = 64.6). It seems that Japanese children are in a unique situation, where their language and their songs have very different characteristics in terms of rhythm. It could be said that children who grow up with Japanese as their mother tongue face a somewhat more difficult psychological task in singing, as they have to sing words/lyrics in a very different combination of rhythms to the rhythm of their spoken language - much more so than native English language speaking children (summarised in Figure 7.16).

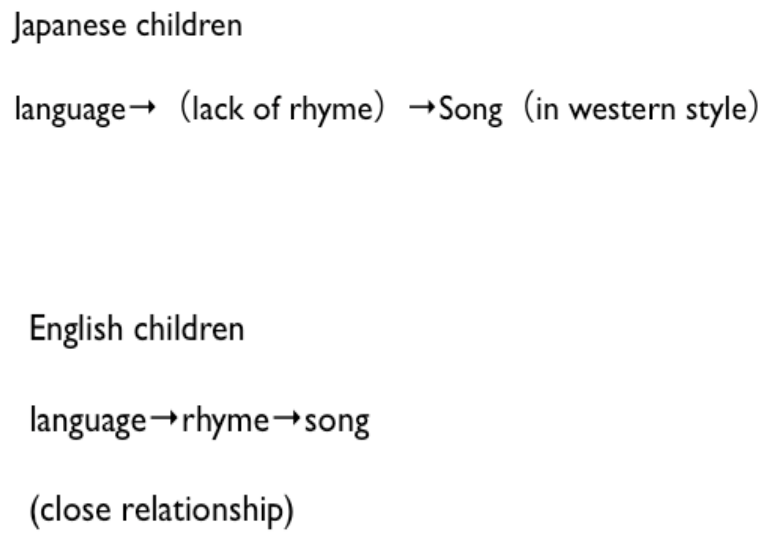


Figure. 7. 16 Psychological task for English children

7.6 Conclusions

Children's songs are likely to be designed with very different characteristics in their underlying rhythm, compared to that of the native language. This tendency is found to be higher in Japanese. The reason for the high nPVI values reported here could be considered to derive from the use of different rhythms in Japanese and in English children's songs, and different notations commonly used in both languages. However, further analysis on the rhythm patterns used in example children's songs was required in order to reach a more defined conclusion on this. It can be considered that the task of singing is psychologically different from speaking concerning the aspect of rhythm, especially for Japanese children.

7.6.1 Further discussion: comparing the score analysis results to actual singing timing analysis

The main findings from nPVI analysis on actual timing of children's singing in two common songs, "Twinkle. Twinkle, Little Star" and "If You're Happy and You Know It" were:

- Singing nPVI values had a closer tendency towards the mother tongue language nPVI for higher age groups than for younger children.
- The three year-old groups in both language and songs showed as opposite tendency to their mother tongue. Japanese children sung with a higher nPVI value than that of the English group, though the language nPVI is lower in Japanese than English.

The main finding of the music score analysis of children's songs in Japanese and English was nPVI values suggest a very different tendency than that occurring in the language. The difference was larger in Japanese. It means that children were faced with musical tasks with a very different rhythm than in their mother tongue rhythm.

This could be an explanation why language influence was not found in the youngest focus age groups in both languages. A three year-old's speech behaviour is not as refined and stable compared to that of older children. Before children's speech rhythm becomes established, the cultural influence is likely to be stronger from other sources such as their familiarization with the rhythm of songs, or the rhythmic motion of game songs. Therefore, it could be considered that the rhythm of the music with which the children are familiar, has some influence on the children's actual singing rhythm, especially for the youngest age group.

Another possibilities of the reason for Japanese young age group could sing dotted rhythm precicely could be found in the situation of early childhood education in Japanese society. It is common in kindergartens and nurserys in Japan to train children to be able to sing and play some musical instruments. There are opportunities to show children's musical performances to the parents and the neighboughs. Outside school music lessons also start in early age. Some kindergartens and nurserys provide those private music lessons as options. Therefore, it could be say that the experience of the music training could be one reason of the Japanese young age group's rhythmic performance data. We should note that the music materials used for young children's lessons were children's songs, and there were big difference of rhythm in Japanese and English children's songs.

A larger gap was found between Japanese children's songs and language nPVI values. The task of singing in the music rhythm may be harder for Japanese children than English children. Considering the varied genres in Japanese song books, which include *warabeuta* and foreign origin songs with Japanese lyrics (composed by Japanese songwriters in the Western music system), it is perhaps natural to assume a large difference between the Japanese language and Western music. A different tendency was evidenced from previous researches pop songs with Japanese lyrics as well. Again the gap between the Japanese language and Western music could be an explanation. Pop songs written in the Western music system were intended to be played on Western instruments. That could be the reason why pop music with Japanese lyrics was the only exception among adult music. Most music nPVI values were lower than language nPVI in previous researches (Patel, et. al., 2003; Sadakata, 2004, 2006; Huron, 2006).

Children's songs have a different rhythmic character to adult/non-lyric music. This could be an explanation for the apparent universality of children's songs. Game songs were chosen to investigate the song characteristic materials for this study in both languages. The process of choosing songs was designed to include various genres of music which were closer to their natural singing environment. Having higher nPVI in children's songs than language and music for adults, implies a non-flat lively rhythm (which easily leads itself to body movement accompanying the singing). This body movement rhythm is likely to have a stronger influence than language rhythm for children's singing rhythm at a younger age.

Chapter 8 An empirical study of musically experienced adults in the reproduction of *Warabeuta* rhythms

8.1 Introduction: "What are warabeuta?: a question posed by university students

As mentioned earlier in Chapter 1, *warabeuta* is a genre of Japanese traditional play songs for children. They are commonly sung when Japanese children play games together. Mothers and nursery teachers will also often sing *warabeuta* songs when playing with their babies and young children. This genre is transmitted among people orally; people remembering such songs through listening and joining in. Through games and associated *warabeuta* songs, it is reported that babies and young children learn about their world, such as nature, language and their mother culture (Koizumi, 1986; Abe, 2002; Ono, 2007). Therefore, the singing and teaching of *warabeuta*, as well as Western style children's songs for young children, is considered to be compulsory knowledge and skills for nursery teachers. However, whilst teaching a university course in 2010 ('Teaching music for elementary school children'), some of my third and fourth students, asked me the question: "What are *warabeuta*?".

It was a surprise to hear the question from them at first. It is a common expectation that (according to previous sources), students must know *warabeuta* songs from their childhood experience, as well as from their earlier studies on the nursery course. The students in the class were all in their third or fourth year of the undergraduate programme and were about to go on teaching practice in nursery and elementary schools. Theoretically, at least, they must have already known *warabeuta* songs, hence my surprise. The university had a good reputation and its graduates (including hopefully too, these current students) were trusted to be capable teachers

within the local community. Yet they reported that they did not know the term "*warabeuta*", even though I discovered subsequently in discussion that they knew some *warabeuta* songs, but without knowing the term. There were a few students who said they remembered playing and singing along with *warabeuta* in childhood games. Some remembered their teachers had taught them examples of *warabeuta* games and songs in elementary school. After I reminded them, most of the students said that they had learned *warabeuta* in the university as a part of the course. However, for these present-day students, *warabeuta* had become something to be studied and learned about from adults or teachers in the university or school classroom.

Furthermore, unlike the original form of transmission, these *warabeuta* were often presented to them in a Western style, with a musical score and piano accompaniment. This is probably why the sound seemed odd and unfamiliar when they listened to an example of children's natural voices singing *warabeuta* from a CD recording in class (*Nihon no Warabeuta 4* , Kondo, 2001, ISBN-10: 483401746X). The CD came with a book introducing 118 *warabeuta* songs. The CD songs had been recorded in natural settings by the singers, children and teachers. Usually the songs would be sung at play during an 'after school club' called *Tontonyakata*. The club was not designed to have traditional teaching-learning sessions, even though there are teachers present. Neither is there any focus on singing training. Children just play games in the club. They play and use the songs in an original style, i.e., reproduced only by the voice, without any instrumental accompaniment.

Thus, when the CD was played in class, the university students seemed surprised to hear the children's vocal sounds and the simple melody and rhythm of *warabeuta*, as this sounded very different compared to that of trained children's singing. These students were most likely to have been brought up listening to J-pop and other

rock music, where the sounds are more complicated, especially in rhythm. Their spoken comments suggested that the simple rhythms of word and lyric in the recorded *warabeuta* sounded strange and new, and the lyrics sounded 'funny'. Some of the students noticed that the *warabeuta* songs' rhythm was exactly the same as the words' rhythm; perhaps another reason why the *warabeuta* songs sounded strange to them.

Consequently, a general research question emerged from this higher education experience that ties in well to the overall focus of the thesis:

> "How do the university students who were not brought up with *warabeuta* perceive and produce the rhythm of *warabeuta* songs?"

Their recent musical experiences as young people were likely to have been dominated by the very complicated relationship between lyrics and song rhythms present in J-pop (Murao & Azechi, 1998; Azechi, 2001). Lyrics are often converted into syllable-timed rhythmic patterns in J-pop. An original mora-timed rhythm form is also sung in a different style, rather than adhering to a traditional rhythm with a fixed number of mora. A reading of the literature covered earlier in this thesis raised related issues as to whether current university students could still follow the traditional simple way of singing song lyrics, which use a mora-timed based rhythm, or whether other aspects of their enculturation would predominate.

To find an answer to the above question, it must be clear which of the linguistic units, mora or syllable, are chosen in the reproduction of *warabeuta* songs, especially in cases of special morae: syllabic nasal [撥音], double consonant [促音], long sound [長音], and double vowel [二重母音]. Therefore, an experiment was established to observe how the university students with experience of studying Western music would fill the theoretical gap between musical notation and the actual singing of *warabeuta* songs.

In this chapter, firstly the gap between the possible musical notation of *warabeuta* and the singing of *warabeuta* will be discussed. This will be followed by a report of a linked clapping experiment.

8.2 The relationship between language and musical rhythms in warabeuta songs: how mora and syllable are treated in warabeuta songs

8.2.1 *Warabeuta* and Japanese language rhythm

Researchers report that the Japanese language rhythm is naturally reflected in *warabeuta* songs (Koizumi, 1984; Kindaichi, 1988; Bekku, 1977; Sugaya, 1975). Often the lyrics are chosen by children as part of their excitement to utter and sing, being interested in repeating the rhyming. These words are emotionally positive and include some characters concerning rhythm itself. Especially in songs accompanying ball play and hand play, which are sung with bouncing motions, the lyrics get chosen as being able to bounce in time.

Koizumi (1984) wrote that "In *warabeuta* songs, the regulation of Japanese language rhythm appeared in the simplest forms（in Koizumi's "*Nihon Dento Ongaku no Kenkyu 2 rhythm*", 1984, p.38）". In his study, Koizumi extracted fundamental characters and forms of rhythms from *warabeuta* songs. In his other book "*Warabeuta no Kenkyu*", he repeatedly stated that "*Warabeuta* reflect the character of the Japanese language very faithfully…(Koizumi, 1984 p.390). He claimed that the Japanese language rhythm is the basis of the *warabeuta* rhythmic form. He also claimed that all the rhythmic foundations of traditional Japanese music could be seen in *warabeuta*. His

study of *warabeuta* rhythm was part of further research into traditional Japanese adults' music.

Koizumi (op. cit.) said that there are three prime characteristics of rhythmic structures in *warabeuta*. These are, in order of importance: (1) the rhythm of the Japanese language [日本語のリズム], (2) the rhythm of song (music) [歌のリズム], and (3) the rhythm of bodily movement which is caused by the playing/game [遊びとしての体の動きからくるリズム].

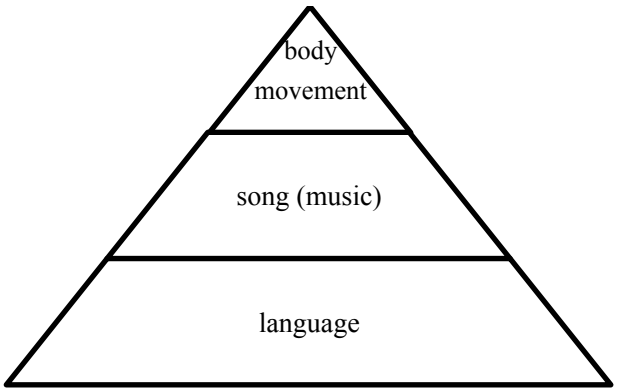


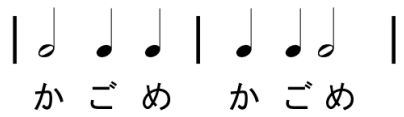
Figure 8.1. An illustration of the prime characteristics of rhythm in *warabeuta*

These prime characteristics of rhythm in *warabeuta* (according to Koizumi) can be illustrated in a pyramid shape figure to better understand the importance of language as a prime factor (Figure 8. 1). Koizumi suggested that "The foundation of the *warabeuta* rhythm is Japanese language rhythm, then the rhythm of the song reflects its music factor; [finally] body movement which is brought about by play is the last factor to determine the specific rhythm [わらべうたのリズムの土台となるのは日本語の言葉のリズムであり、次に、歌の音楽要素としてのリズムが影響し、最後に遊びによりともなう体の動きがリズムを決定すると考えていた] (1984, p38).

In the following section, Koizumi and other researchers' ideas are reported concerning: (1) Japanese language rhythm [日本語のリズム], (2) the rhythm of song (music) [歌のリズム] and (3) the rhythm of bodily movement which is caused by the play/game[遊びとしての体の動きからくるリズム].

(1) Japanese language rhythm [日本語のリズム]

Koizumi said that Japanese lyrics were sung as "one tone equivalent to one beat［１音１拍］" (Koizumi, 1984). It can be described as " 1 tone = 1 beat". According to Koizumi, one tone [１音] means one pronounceable unit in the Japanese language and one beat [１拍] stands for a musical note. Therefore, this means that one pronounceable language unit is sung as one musical note. As an example, the beginning of the *warabeuta* song "kagome kagome" [かごめかごめ] is presented below (Figure 8. 2). Song titles of *warabeuta* are often matched to the beginning of the song lyrics.



ka go me ka go me

Figure 8.2 Example of "1 tone = 1 beat" from the beginning of a song "kagome kagome" [かごめかごめ]

The idea of "one character equivalent to one musical note" matches the character of the language rhythm, such as in the Japanese poetic rhyming form, a verse in seven-and-five syllable metre [七五調] and five-and-seven syllable metre [五七調]. In *warabeuta*, the lyrics are formed in this traditional rhyming style.

Until the 1990's, the terms used to describe musical and language sounds were often employed differently from the way they were in the West, and misunderstood in researches in Japan (Bekku, 1977; Sugaya, 1978; Kindaichi 1988). For example, Japanese literature researchers used the term character [moji/ji 文字/字] to count a phonetic unit. This was applied from the traditional custom of using the number of characters to form or analyze Japanese poetry. Later, the researchers started to apply English or foreign ideas of phonetics to Japanese phonetic units (Ota et. al., 1998; Kubozono, 1999; Haraguchi et. al., 2002). They started using words such as beat [拍], syllable [シラブル] and phoneme [音素]. Although they used these terms, they had to add some explanation that the specific term was not suitable all the time, to describe the phonetic units of the Japanese language. For example, the number of characters is not always equivalent to the number of phonetic units. One character does not mean one sound all the time. Some phonetic units (sounds) were written in two characters. Another example is a character [っ], which stands for a silence, which has its same duration/weight as a character. The use of the term "beat" made things confused in analyzing the use of language in songs. Above all, the term "syllable", in this case written in katakana (Japanese characters) [シラブル], created some confusion among people when they started comparative analysis of languages. In linguistics, a syllable means a phonetic unit, which has CVC (consonant-vowel-consonant, e.g. dog) form. Sometimes, the numbers of consonants and vowel are increased/decreased, such as CCVC (e.g. track), CVCC (e.g. first), CVVC (e.g. fuel), CCVVC (e.g. straight), and so on, but basically it follows a CVC form. This definition of the term syllable did not suit the basic phoneme of the Japanese language, which became to be known as *mora* to linguists, and later music researchers. A mora basically has CV (consonant-vowel) form and sometimes the consonant is omitted (see also 6. 1). Plus, unique morae in

Japanese are the sound for “n” [ん], a symbol for vowel [ー] and silent character [っ]. These three morae are considered as independent phonetic sounds and counted as one character, beat or sound in the Japanese language. The term mora became common after Kubozono’s (1993) study of Japanese prosody *The organization of Japanese prosody* (Studies in Japanese Linguistics 2. Tokyo: Kurosio Publishers). His studies made it clear that the prosodic unit of Japanese is a mora, not a syllable. Therefore, by applying this idea from published research post-Kubozono’s study, the basic form of lyrics sung in *warabeuta* can be considered as “1 mora = 1 music note”. The character of ‘n’ (syllabic nasal [ん]), double consonant (silent character [っ]), long vowel [ー] and latter character of double vowel (e.g. latter character of the concessive vowels, “i” in (ai [愛]) , and “u” in (au [合う]) are also applied to one musical note as an independent sound unit that holds the same tone/phonetic value (see for example, Murao & Azechi, 1998, in which J-pop lyric rhythm was studied using morae as the Japanese language phonetic unit).

However, in natural Japanese conversation, syllable and mora exist as prosodic units at a same time (Kubozono, 1999). The Japanese language has a double structure in its prosody. Special morae, such as syllabic nasal [ん], double consonant (silent character [っ]), long vowel [ー], and latter character of double vowel (e.g. latter character of the concessive vowels) are considered as independent morae in theory, but sometimes they are not distinct enough to stand as an independent prosodic unit (Kubozono, 1995, p.179). Therefore, these special morae are seen to be “weakened”, and pronounced as a part of syllable together with another mora, which is placed just before it. In such cases, the syllable also becomes a prosodic structure of the language (Kubozono, 1995). Consequently, a double rhythmic structure of mora and syllable co-

exist as minimal units of the rhythm in Japanese songs, especially in J-pop and rock music.

8.2.2 The gap between the mora and syllable prosodic structures

Below are examples of the differences between mora and syllable prosodic structure.

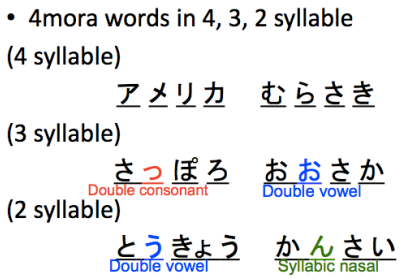


Figure 8.3 An illustration of differences between syllable and mora prosodic structure

In the example above (Figure 8.3), these are all four mora words, but they are often pronounced as four, three, or two syllable words in natural conversation. The word "America" consists of four morae, a [ア], me [メ], ri [リ] and ka [カ], and pronounced in four syllables (prosodic units). In the middle row, the word "Sapporo" also has four morae, but when it is pronounced, it sounds like three syllable words, sap [サッ], po [ポ], ro [ロ]. The word "Tokyo", in the third row, also consists of four morae, but is usually pronounced in two syllables such as, to [とう] and kyo [キョウ]. These double structures which are made by the special morae, can create confusion when they are sung and written in Western style music notation (see Figure 8.4 below as an example).

They are two common (or traditional) *warabeuta* rhythm patterns for when the word "ongakushitsu" (meaning 'music room' [おんがくしつ]) is sung. The word

has six morae and could be pronounced in 6 or 5 syllables. In a case where the words are sung with 6 morae having the same duration of sound, it can be written in two different ways in musical notation. If it is thought of as 6 syllables and given 6 musical notes, it might be sung as the rhythm pattern presented in the upper row of Figure 8.4, i.e. in 6 successive eighth notes or quavers. But if it is considered to be 5 syllable words and given 5 music notes, it could be written as the lower rhythmic pattern (i.e. the first two morae are given one quarter note/crotchet, and other morae are given eight note each). Basically, the first two morae are given independent notes when there occurs a tonal change.

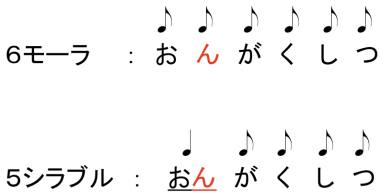


Figure 8.4 Different musical notations generated by applying the double prosodic structure (mora or syllable) in Japanese language for ‘ongakushitsu’

8.2.3 Rules for taking music notation

In Koizumi”s study (1982, research on *warabeuta*, p. 277-278), basic rules for taking music notation was clearly provided in his significant fieldwork on *warabeuta*. The rules were listed as below;

- one phonetic unit equals to one music note;

- use a rest note for double consonant (e.g. character “っ” is applied a rest note);
- apply one musical note for two phonetic units in case where syllabic nasal and double vowel were sung smoothly;
- use symbol “ー” for lyrics in cases where the musical note moves in one phonetic unit.

The most important rule is the first one that “one phonetic unit equals to one music note”. Koizumi used the word “a phonetic unit [音節]” not “a character [文字]” because he recognized that there are characters which cannot stand as an independent sound unit. The other rules, apart from the first one, were all explanation of those characters, which cannot be equal to the most of other characters, therefore cannot be applied to one music note. His “phonetic unit” matches to mora.

8.2.4 The song rhythm

The song rhythm, as defined by Koizumi, means the musical rhythmic component of a song. His analysis of Japanese songs was always focused on the sense of metre [拍節感], phrasing structures [フレーズのまとまり], and the beginning and ending styles of phrases [フレーズの始まる感や終止感]. He stated that the rhythms which these musical phrases consist of, are also reflected in, the natural rhythm of the Japanese language. Therefore, the traditional five-and-seven or seven-and-five syllable metre rhyming forms were often found in *warabeuta* (Koizumi, 1982). Japanese scholars of Japanese literature and language, Sugaya (1975), Bekku (1977), Kindaichi (1988) for example, explained the five-and-seven or seven-and-five syllable metre forms in traditional poems with figures as below (Figure 8.5).

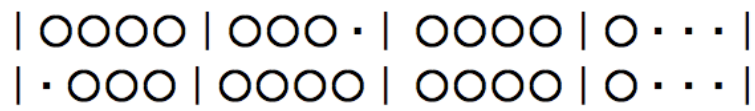


Figure 8.5 Typical seven-and-five syllable meteric rhyming forms in a traditional Japanese poem (Kindaichi, 1988)

In Figure 8.5, circles [○] indicate characters of words, which are equal to morae, and dots [・] are rests. The circles and the dots hold an equivalent amount of duration. They have the same length as beats. The five or seven characters were uttered, recited or sung, as one set motif, and those motifs form phrases. The bars show that the characters were rhymed in four beats metre. From the figure, it is easy to see the metric structure and phrasing in a traditional Japanese poem. Japanese traditional metric structure for verse, seven-and-five or five-and-seven syllable metre are easily recited or sung in a four-metre musical structure.

Kindaichi (1988) showed a poem as an example as below (Figure 8.6).

i ro ha ni ho he to chi ri nu ru wo
｜いろはに｜ほへと・｜ちりぬる｜を・・・｜

ka wa zu to bi ko mu mi zu no o to
｜・かわず｜とびこむ｜みずのお｜と・・・｜

Figure 8.6 Examples of the seven-and-five syllable metric structure poems

Koizumi added some musical aspects to the character-based poetic formula. He did not choose four metre for the formula, but two metre. Because he thought that former-latter positioning, i.e. a pair of two notes which are positioned in a former-latter relationship, to be one of the important aspects of music rhythm in Japanese traditional songs. Koizumi identified a four bar phrasing structure, which is often found in *warabeuta*, as Figure 8.7.

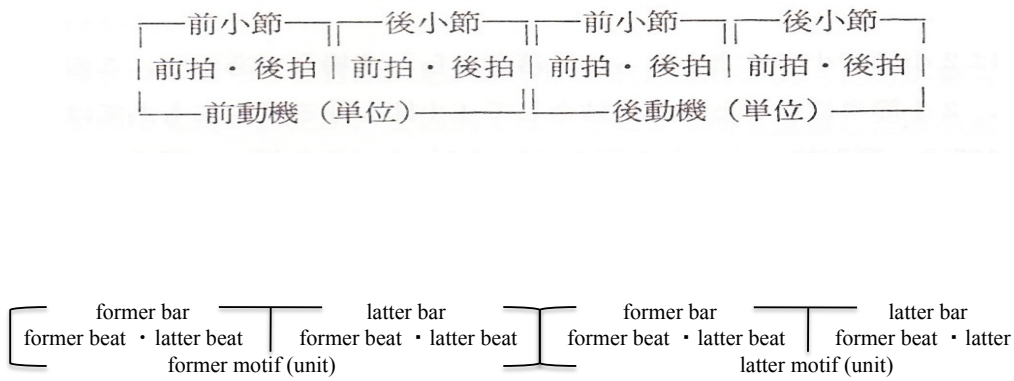


Figure 8.7 Koizumi's formula (1984, p.106) of four-bars-structure in Japanese (above) and the translation of it (below)

As is indicated in Figure 8.7, the former-latter positioning has an important role in *warabeuta* songs. The same structure for lyrics could be differentiated in rhythm by alternate vocal emphasis. To emphasize the beginning or ending atmosphere of a phrase, or certain lyrics (which have the same structure and consist of the same number of morae/characters words), they can be stressed in different rhythms. Rhythm in singing is decided by the position of the lyrics. For example, five mora/character words could be sung in type seven rhythm (in Koizumi's table of typical rhythm patterns in

warabeuta, 1987, see Figure 8.8) [♩ ♪♪ | ♩ ♩] when they are positioned at the beginning of sung, as "former motif (unit)" in the Figure 8.7. However, the same structured 5 morae/characters words could be type eight rhythm [𝅝 | ♩] when positioned in a "latter motif (unit)", as in Figure 8.7.

番号	字数とその区分	拍の配分によるリズム	フレーズの部分	例数
1	8(4+4)字		前	多
2	7(4+3)字		(段落感)後	
3	7(3+4)字		前(出発感)	多
4	6(3+3)字		(まとまり)全	多
5	6(3+3)字		前(出発感)	
6	6(4+2)字		前	
7	5(3+2)字		前(出発感)	
8	5(4+1)字		(段落感)後	多
9	4(2+2)字		前	多
10	4(3+1)字		(まとまり)全	
11	4(3+1)字		(段落感)後	多
12	4(1+3)字		前(出発感)	

注: 1) ♫.♬ は ♫♫ にふくめる
2) 𝄾♪♫ は ♩ ♫ の変形と見る
3) ♩ 𝄽 は ♩ と同じとする
4)〈フレーズの部分〉とは より大きなフレーズを構成する時に占める位置が,前=前半,後=後半,またそれ自身でまとまった全=全体であるかの別

Figure 8.8 Koizumi's table of typical rhythm patterns in *warabeuta* (Koizumi, 1984, p.84)

In the table above, Koizumi uses the word "character [字]" as a minimal phonetic unit, but it is equivalent to a mora. Another important elements in Figure 8.8 is

that “注：１” indicates that dotted rhythm is included in equal timed rhythm. This is because Koizumi thought the dotted rhythm in *Warabeuta* were caused by other factors such as particular phonetics in the language, such as syllabic nasal sound [撥音], double consonant [促音], long sound [長音], double vowel [二重母音], and motions of the playing game. Dotted rhythm does not exist naturally in traditional Japanese music because most of characters/morae in the Japanese language are sung in the same durations.

8.2.5 Rhythm caused by body movement

Koizumi stated that dotted rhythm (noted in rhythm as [takka no rizumu タッカのリズム]) happened in special cases only. It occurred with the body motions of playing a game while singing the songs, or by the lyrics which contain special morae which cannot be uttered as having equivalent duration in conversations (Koizumi, 1984). There are *Warabeuta* songs which were sung while playing games, requiring players’ bodies to maintain certain motions, such as bouncing balls, jumping rubber bands, skipping ropes, and using fingers and hands. The lyrics of these game songs often contained special morae, such as syllabic nasal [撥音], double consonant [促音], long sound [長音], and double vowel [二重母音] to make the language rhythm bounce. Especially in ball game songs, the body motion mimics a bouncing ball. It is common for ball game songs to have many verses, because the game is a competition to see how long the player can keep the ball bouncing. Therefore, latter verses often contain lyrics which do not really fit with the original rhyming/metric structure of the first verse. More than the original number of morae/character words would be squashed into the beats. This would cause some gaps between the music and language rhythm, different

notations of the music, and gaps between actual speaking rhythm and music notations. Another factor to cause such a gap could be because of the custom in music notation of a so-called “dotted rhythm” [takka no rizumu タッカのリズム].

8.2.6 Customs of the music notation in Japanese songs

One of the factors causing this different use of music notations for the same phonetic words could originate in customs of music notation. A good example is the “dotted rhythm” [takka no rizumu タッカのリズム]. This unwritten rule of music notation is also caused by the double structure of the lyrics rhythm, mora and syllable.

Dotted rhythm, which is often written as a dotted eighth note/quaver followed by a sixteenth note/semi-quaver [♪. 𝅘𝅥𝅯], appears in game songs in *warabeuta*. In the ambiguous singing of children, the singing rhythm is not steady. The two notes of this dotted rhythm often change in ratio from 3:1 to sometimes 1:1 (a tempo change), especially when the children are playing games. According to Koizumi (1987), the dotted, un-equal-timed rhythm was a product of the physical motion of playing the game, or special phonetics, whilst the basic rhythm of Japanese songs is equal-timed. Because of this ambiguity in the singing rhythm, the music notation of this non-equal-timed rhythm also varied. Koizumi himself once wrote in his book that the *takka no rizumu* [タッカのリズム] could be notated in dotted rhythm, equal timed rhythm, or in triplets (Koizumi, 1987).

The Figure 8. 9 (below) has a list of the written rhythm types of the beginning of the two *warabeuta* songs “Zui Zui Zukkorohashi” and “Antakgata Dokosa”. The music notations were obtained from *Nihon Warabeuta* Zenshu (Obara, et. al., 1979-1994) and *Nihon Doyo Zenshu* (Sanbe, 1974). Both songs were sung during play, in

bouncing rhythm, and contain many special morae in their lyrics at the beginning. They are quite popular songs, therefore found all over Japan, but sometimes they were sung with a different pitch, melody, and lyrics. The differences are evidenced in the various music notations. Sometimes, the lyrics were changed to reflect the dialect. The tonal difference also influenced a change of the melody pitch (Obara et. al., 1969-1994). However, in the case of rhythm, though it is written in different ways, still the difference may not be so obvious in performance. The rhythms of different notations can indicate a quite similar or even the same rhythm. To illustrate the rhythmic difference in the music notation, the beginning of the two *warabeuta* songs are listed as below (Figure 8. 9).

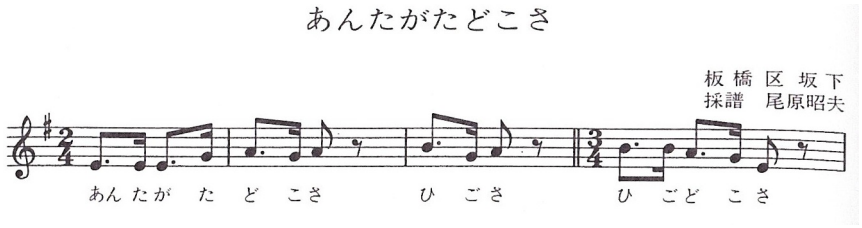
	Antagata Dokosa		Zui Zui Zukkorobashi	
prefecture	written rhythm	different lyrics	written rhythm	different lyrics
Nihon Doyo Zenshu (Sanbe, 1974, Ongakunotomosha)				
	triplets in 2/4 (6/8) metre		eighth notes	
Nihon Warabeuta Zenshu (Obara et. al, 1969-1994, Yanagihara shupan)				
Hokkaido	dotted		dotted	
Aomori	dotted	…どっこさ		
Miyagi	dotted			
Tochigi	dotted		dotted	
Ibaraki	dotted		eighth notes	
Tokyo	dotted		dotted + quarter notes	
Saitama	dotted		dotted	
Kanagawa			eighth notes + quarter notes	
Chiba			dotted	
Toyama	dotted		eighth notes	
Niigata			dotted	
Fukui	dotted			
Yamanashi			dotted	
Gifu			dotted	
Mie	dotted			
Shiga			toriplets	
Osaka			eighth notes	
Nara	dotted			
Hyogo			eighth notes	
Okayama	dotted			
Hiroshima	dotted	…どっこぃさ		
Yamaguchi	dotted	…どっこさ		
Kagawa	dotted			
Tokushima	dotted			
Fukuoka	dotted			
Oita	dotted	あんたとこ…	quarter notes	…ずっりばちゃ
Kumamoto	dotted			

Figure 8.9 A list of the rhythm's types of the beginning of two *Warabeuta* songs

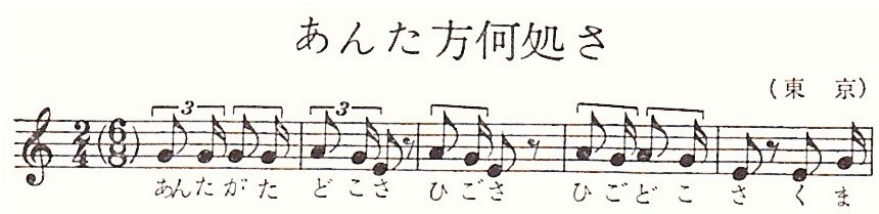
"Antagata Dokosa" was notated in same rhythm in all the books of the *Nihon Warabeuta Zenshu*. It was written in a repeated dotted rhythm, which is a pair of dotted eighth notes followed by a sixteenth note in 2/4 metre (see Figure 8.10 below). Only in

Sanbe's 'Nihon Doyo Zenshu', is it written as eighth notes and sixteenth notes paired in triplets, in 2/4 (6/8) metre.

Two examples of different notations of "Antagata Dokosa" are shown below (see Figure 8. 10). This song also contain a special mora [ん, syllabic nasal "n"] as a second character of the lyrics, but it is not matched to one music note. It is a play song sung with a ball, therefore a bouncing rhythm (caused by the body motion, according to Koizumi's theory) dominates throughout the song.



Example 1: in dotted rhythm (notated by Obara, collected in Itabashi ward, Tokyo, publisher: Yanagihara Shoten, 1979)



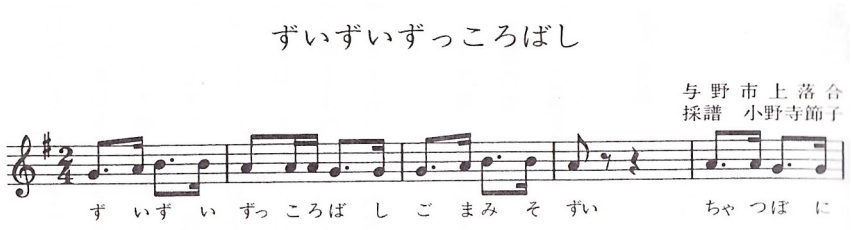
Example 2: in triplets, 2/4 metre (edited by unknown person, collected in Tokyo, Machida & Asada, 1984, in Iwanami Bunko)

Figure 8.10 Two examples of different notations of a same song "Antagata Dokosa"

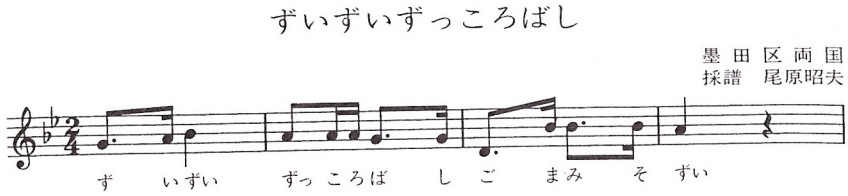
In Figure 8.10, there are two different musical notations of the same *warabeuta* song "Antagata Dokosa". The upper example is from 'Nihon Warabeuta Zenshu', Yanagihara Shoten, the lower one is from Iwanami Bunko. Both songs were collected in Tokyo, have exactly the same lyrics, but sung at a different pitch. The rhythm is notated in

different ways, one is in dotted rhythm, and the other is in triplets. However, it is not clear that the actual sung rhythm of the two notations was in a 3:1 ratio, which is written in dotted rhythm, or 2:1 ratio in triplets. The intention of the person or persons who made the transcriptions is unknown. Obara, the person who made the fourth notation may just have followed the custom that the bouncing rhythm be written as a dotted rhythm. But the notation from Iwanami seems to indicate that the person who wrote the music notation wanted to make it clear that the bouncing rhythm was sung in a 2:1 ratio duration.

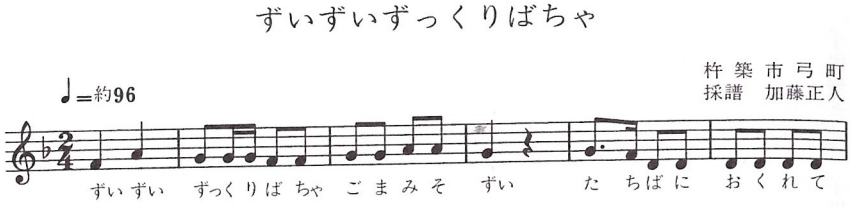
Another *warabeuta* song "Zui Zui Zukkorobashi" was notated with several different rhythms. Figure 8.11 illustrates examples of a *warabeuta* song "Zui Zui Zukkorobashi" in various notations. This song is a hand playing game song. It contains many special morae. The beginning part of the song starts with four characters/morae [ずいずい (z u i z u i)]. The second and fourth character/mora ぃ are positioned as the second vowel in the double vowel syllable [zui ずぃ]. The mora "i" can be sung as an independent musical note. It could also be a weakened mora turned into the latter part of a double vowel syllable. In that case, the character ぃ is not provided with any musical note.



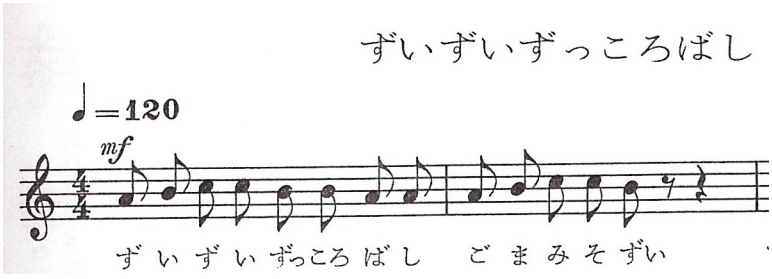
Example 1: in dotted rhythm (notation by Onodera, collected in Yono city, publisher: Yanagihara Shoten, 1969)



Example 2:in dotted rhythm followed by a quarter note (notated by Obara, collected in Sumida ward, Tokyo, publisher: Yanagihara Shoten, 1979)



Example 3: in two quarter notes (notated by Kato, collected in Kinetsuki city, publisher: Yanagihara Shoten, 1969)



Example 4: in successive eighth notes (Sambe, 1974)

Figure 8.11 Examples of four different notations of the same song “Zui Zui Zukkorobashi”

Three of the notations were from *Nihon Warabeuta Zenshu* 日本わらべうた全集 (Japanese *warabeuta* complete works), Obara, et. al., 1969-1994, published by

Yanagihara Shoten. Another is from Sambe's *Nihon Doyo Zenshu* (1974) by Ongakunotomosha. The first example, *Nihon Warabeuta Zenshu* was part of an intention intended to collect *warabeuta* from all over Japan and to notate these to reflect the original musical features in singing. Songs from each prefecture were bound in one or two volume books. Therefore, the same songs sometimes appeared in several books. The other example, *Nihon Doyo Zenshu* (1974) was also edited as a collection of popular children's songs at the time. The editor Sambe wrote in the introduction that he tried to ensure that the music notation was the same as the actual singing, though sometimes *warabuta* singing does not quite fit into Western musical notation for the pitch and the rhythm.

The lyric in the first bar [zu i zu i ずぃずぃ] is written in four characters in Japanese. The number of mora is four. But when these are counted as syllables, it is two. It means that these four character lyrics can be sung as four or two music notes. When pitch change occurred from the first to the second note, they were written as two different music notes, in two eighth notes, in a dotted eighth note and a sixteenth note. When the pitch is not changed, one syllable is written in a quarter note.

It could be concluded from such analyses of different musical notations for the same warabeuta songs that (1) variations of the rhythm in singing are not always reflected in the pitch, (2) pitch change on a special mora could cause different notations, (3) confusion in the music notations may be have been caused by the custom of writing a bouncing rhythm as a dotted rhythm. Therefore, it could confirm that the musical notation of rhythm in warabeuta does not always reflect the actual sung rhythm.

8.3 Re-production of Warabeuta rhythm by hand clapping

8.3.1 Which dominate as the beat unit, mora or syllable? (In the case of weakened morae)

Currently, university students learn warabeuta as part of their course study programme. Having a knowledge of warabeuta is compulsory in becoming a nursery school teacher. The original warabeuta that students study are most likely to have once been transmitted from children who sang these songs as they played games together, or who learned them by listening to others. Adult students sometimes learn warabeuta songs from a Western style music score, not from remembering them from the games they played as children. Perhaps they have less childhood experience of play using warabeuta songs than previous generations. As mentioned earlier, I observed several times in my class that the university students were very surprised when listening to recorded warabeuta songs on CD (Kondo, 2010, Nihon No Warabeuta) which had been sung by children and recorded while they were playing games. These songs were sung without any instrumental accompaniment, using only the young children's voices. The lyrics, including onomatopoeic (meaningless) words, were repeated with a simple melody and rhythm. From the students` reaction, it can be surmised that the *warabeuta* songs sounded very different for those who were primarily used to listening to J-pop, which is Westernized and has a complex relationship between the rhythm of the song and the lyrics. In J-pop, sometimes the lyrics are sung in a syllable-timed rhythm, rather than a mora-timed rhythm (Azechi, 2001, Murao & Azechi, 1998). Especially some particular morae such as っ, ん, ー, 二重母音 (syllabic nasal [撥音], double consonant [促音], long sound [長音], and double vowel [二重母音]) are sung in syllables rather than morae. These morae are not given one independent music note in a syllable-based

rhythm, but formed from one music note with another mora. In a way, it can be seen that current university students have become accustomed to syllable-based, rather than mora-based musical rhythm. They are familiar with the more complicated (mora-and-syllable) double structured rhythm of J-pop, but not the language rhythm reflected in simple mora-based rhythm. However, there are also double-structured rhythm parts in traditional *warabeuta* songs, especially in game-playing songs, where special morae are often weakened, becoming a part of syllables appearing in the lyrics. These special morae function as a trigger to cause a bouncing rhythm, as required by the body motion in playing the game.

This study was planned to investigate current university students' rhythm production and perception of *warabeuta*. They were asked to clap their hands to produce the "dotted" rhythm in *warabeuta*. One analysis of their hand clapping rhythm was undertaken to see whether syllable or mora perception had dominance in their rhythm schema (Focus 1). Another focus was to see the actual ratio of pairs of two notes used for notation of the dotted rhythm (Focus 2).

Foci in analyses

There were two aspects to investigate through this analysis. Focus 1 is mora or syllable; to determine which dominates the current university student's rhythmic production of *warabeuta* songs. Focus 2 is the actual ratio of two music notes of dotted rhythm in *warabeuta* songs.

Focus1: Mora or syllable?

Which phonological unit (mora or syllable), would be preferred by the students for re-producing *warabeuta* song rhythms by hand clapping?

Koizumi and other researchers said that the rhythm of the Japanese language is naturally reflected in *warabeuta* song rhythms (Koizumi, 1984, 1982; Iwai, 1988; Abe, 2004). The basic phonological unit in the Japanese language is the mora, not the syllable. Although the Japanese linguist Kubozono (2002) states that double structure phonological units (mora and syllable) exist in Japanese, still, it is the mora that is considered the principle phonological unit. This is because it matches Japanese written characters, and has been used as the minimum rhythmic unit in traditional Japanese poetry. Therefore, it ought to be the mora unit, rather than the syllable unit, which should be preferred by university students for re-production of *warabeuta* song rhythms by hand clapping. However, modern students are more familiar with, and were brought up with, J-pop and other music styles, which have more complex lyrical and musical structures (different to *warabeuta*). University students might thus be more familiar with the syllable unit rather than mora unit in some cases, such as where the special (weakened) morae are included in the lyrics. To find out the answer, some specific phrases, which contain the special morae, were chosen for this analysis.

Focus 2: The actual ratio of "dotted rhythm"

Dotted rhythm, the ratio of musical notation 3:1 is often produced in various ratios in real music performances (Sadakata et. al., 2004; Ohgushi, 2006). Sometimes the ratio is in 2:1 or rather 1.8:1 in actual performance. Often, students under training play the 3:1 dotted rhythm in 2:1 (at least, it is common in Japan). Therefore, music teachers, who want the students to play in a precise rhythm, need to teach to correct it with a 3:1 ratio dotted rhythm. Also, in psychological studies (music perception studies), it has been reported that 1.8:1 ratio length notes can be perceived as 2:1 length (Sternberg, et. al., 1982). In this study, the actual ratio of the university student's re-production of

warabeuta rhythm (by hand clapping) were investigated for the perception of their *warabeuta* song rhythm by memory.

Recordings

The recordings were undertaken at two universities in Aichi prefecture, Japan (Aichi Prefectural University and Chubu University). At Aichi Prefectural University, ten third and fourth year students (female, aged 21-23), and at Chubu University, eighteen first year students (three male and fifteen female aged 18-19) were asked to contribute to the recordings. Recording was carried out during a game-playing situation. The games were carried out in 6 different classes.

In each class, the students were asked to re-produce well-known *warabeuta* and other children's playing songs by hand clapping in the class in front of approximately 20 other students who were asked to guess the titles of the songs. A song title and lyrics were provided confidentially to each student who then presented the song by hand clapping to the rest of the class, inviting them to guess the title. The song title and the lyrics were displayed to each student via a power point slide on a laptop computer monitor. The other students (who were to listen to the clapper), could not see what the song was. Each student clapped his/her hands in front of the laptop while facing the other students. For the recording, a MacBook internal microphone and SoundStudio 2.1.1 were used (see Figure 8. 12). Subsequently, all focus elements from the recordings of the students' clapping were analyzed using *WaveSurfer* 1. 8. 5 (see chapter 4. 2. 4)

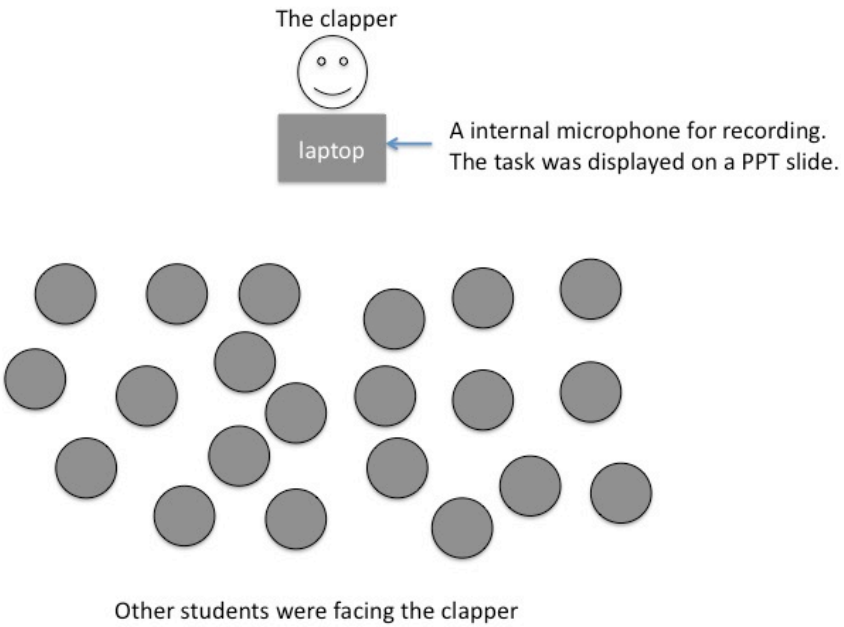


Figure 8.12 An illustration of the game play setting

The first slide presented to the students was below (Figure 8. 13). The task was written in Japanese. The title (at the top of the slide) is the name of the game: "Guess the Title of the Song", and the following sentence says: "Present the song by hand clapping. Let the other students guess the title of the song."

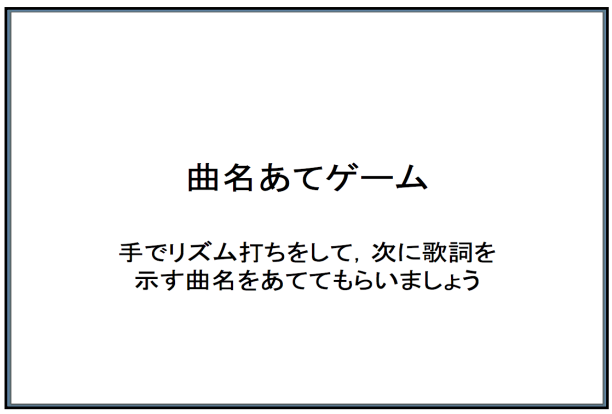


Figure 8.13 Slide 1 shows an explanation of the game (in Japanese)

The songs

Four songs were performed during the games.

- ‘Antagata Dokosa’ あんたがたどこさ (Where are you from?, ball bouncing game song)
- ‘Zuizui Zukkorobashi’ ずいずいずっころばし (hand/finger game song)
- ‘Obentou’ おべんとう (Lunch Box)
- ‘Obentou bako’ おべんとうばこ (Lunch Box, hand game song)

‘Antagata Dokosa’ and ‘Zuizui Zukkorobashi’ are common traditional *warabeuta* songs. ‘Obento’ was composed by Michiko Ichimiya as a children’s song for kindergarten. ‘Obento Bako’ is a modern *warabeuta* song (composer unknown). All four songs are commonly sung in nursery and kindergarten in Japan. However, only three students out of twenty-eight were able to successfully clap their hands for ‘Obento Bako’ and only five out of twenty-eight for ‘Obento’. Therefore, only ‘Antagata dokosa’ and ‘Zuizui zukkorabashi’ were chosen for detailed analysis.

Three *warabeuta* songs and a children’s song were selected for the game: Antagata Dokosa, Zui Zui Zukkorobashi, Obentou bako and Obentou. All four songs are commonly sung in nursery and kindergarten in Japan. “Obento” was composed by Michiko Ichimiya in the Taisho era (1912 - 1926). The title and lyrics of the songs were presented on each slide (as below, figure 8.14). The song order was altered for each game.

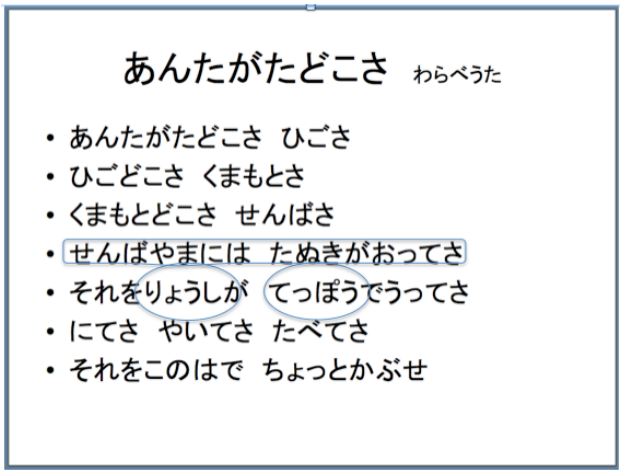


Figure 8.14 The slide presented to each student: ‘Antagata Dokosa’

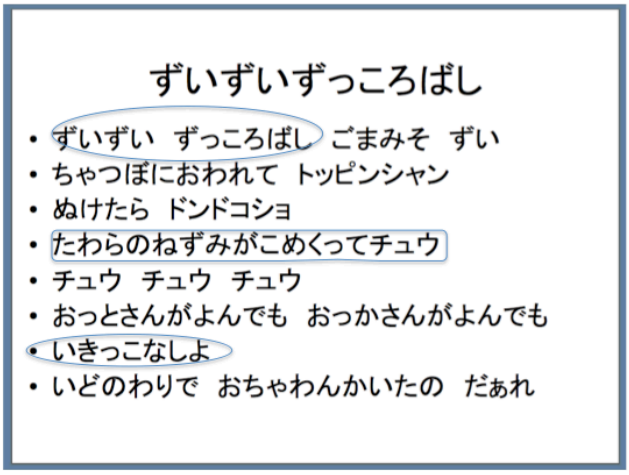


Figure 8.15 The slide presented to each student: ‘Antagata Dokosa’

The blue squares and two circles on the slides were not presented to the other students (the clappers). The blue squares indicate the part of the lyrics for the analysis on the ratio of actual tone length. Circled lyrics contain some special morae, which could be perceived as both independent mora and/or a part of the syllable. They were also the analyzed part of the lyric, in order to detect the influence of the special morae and to see whether a mora or a syllable was chosen in re-presentation of the *warabeuta* rhythm.

‘Antagata Dokosa’: double vowel and double consonant (silent letter)

This is a song for a ball bouncing game. The circled part of the lyrics (Figure 8.14) contains weakened mora. Therefore, there are a few different ways for the lyrics to be clapped. For example, りょうしが [*ryo u shi ga* (literally meaning ‘A hunter does’)] contains four mora. But the second mora ‘u’ could be considered as the latter half of a double vowel. It is sometimes weakened phonetically, and pronounced as a part of syllable りょう [ryou] with the previous mora (i.e. the two mora are effectively combined to make one sound). In the latter case, when the double vowel mora were regarded as a part of syllable, its clapping might be a three, instead of a four. Another special mora: double consonant (written as a silent letter っ), was included in the second circled part of the lyric. てっぽうで (which literally means ‘by a rifle’) is a five mora word [te, silent(p), po, u, de]. Silent letter ‘っ’ and single vowel ‘u’ were the special morae, not strong enough to stand as independent mora, especially when sung in such a fast tempo song as ‘Antagata Dokosa’. Therefore, the lyric てっぽうで was sung as in three music notes [tep pou de]. The rhythm was be re-produced in 3, 4 or 5 claps.

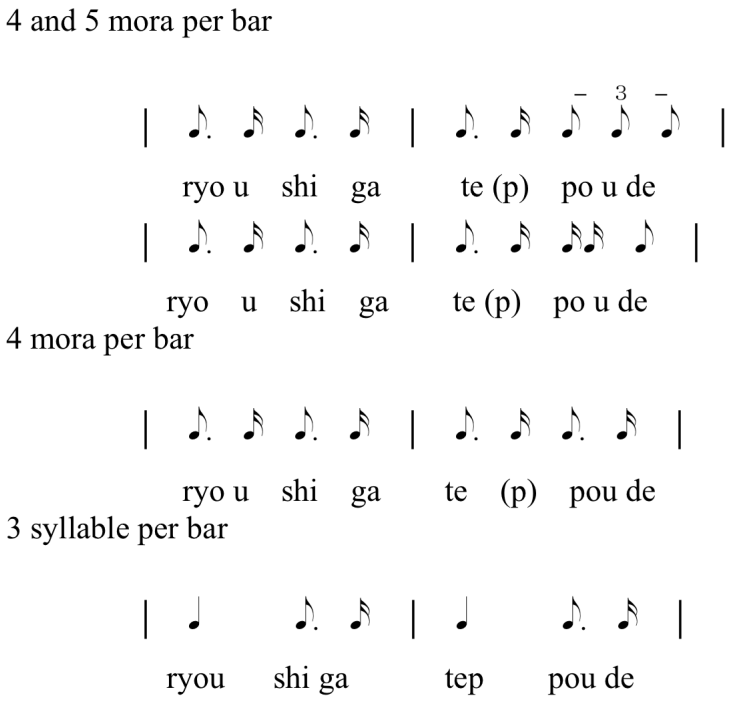


Figure 8.16 The expected clapping rhythm for the lyric ‘ryo u shi ga te p po u de’ りょうしが　てっぽうで.

The song was written in music notation in various ways (Figure 8.9 in previous section, and more details were in Figure 8. 2. 6 in the previous section). In Machida’s music notation, the rhythm was written in triplets (Figure 8.17. below). Machida, who made the music notation, used triplets. However, this notation is not common in current university students’ textbooks of *warabeuta*. The reason why Machida used triplets was to make the notation match as closely as possible to the actual singing rhythm. The intention of his *warabeuta* song book was to collect and record existing *warabeuta* songs from all over Japan at that time. All his field-workers (music notaters) were asked to write their music notation in such a way as to be able to re-produce the exact vocal melody via music notation.

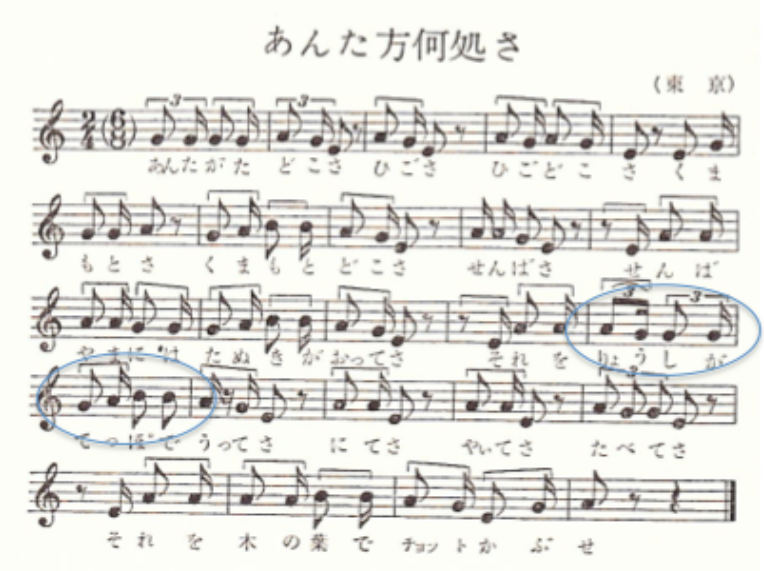


Figure 8.17 ‘Antagata Dokosa’ music notation by Machida, in “Warabeuta” (Asano, 1962) 町田，浅野編『わらべうた』1962 岩波文庫

‘Zui Zui Zukkorobashi’: double vowel and double consonant (silent letter)

This song is a finger play song. Although the music notation below (Figure 8.18) was written in an equal-timed rhythm (successive eighth notes), it is usually sung in a bouncing rhythm among children, which is usually written in dotted rhythm.

The beginning part of the song (circled in blue) was chosen for the first (mora/syllable) analysis. The lyric ずいずい　ずっころばし　[zu, i, zu, i, zu, silent (k), ko, ro, ba, shi] has 10 morae. It contains three special morae, two ‘i’ [い: the latter part of double vowel] and one silent letter [っ double consonant]. The ‘i’ s were written as eighth notes, and silent letter was an eighth rest in Machida’s music notation (Figure 8.18, Asano, 1962). Other ways of writing the double vowel could be dotted rhythm (zu ♪. i 𝅘𝅥𝅯), or quarter note (zui ♩).

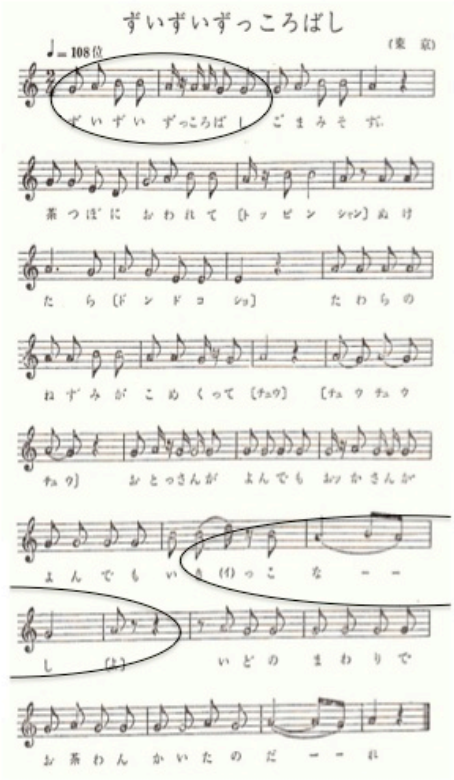


Figure 8.18 ‘Zui Zui Zukkorobashi’ music notation by Machida, in “Warabeuta” (Asano, 1962) 町田，浅野編『わらべうた』1962 岩波文庫

The other circled part of the lyric いきっこなしよ [i, ki, silent (k), ko, na, shi, yo] has 7 morae. The third letter っ is a silent letter (double consonant), and the last three morae なしよ [na, shi, yo] are usually sung with longer/extended/added notes (産み字), because it is the end part of a phrase. Tone change is notated in eighth notes with a slur in Machida’s notation. The mora な [na] is sung in three music notes, one quarter note in A and two eighth notes in B and A. This is a common phrase ending style in Japanese traditional songs. It would be interesting to see whether the current university students follow this tradition in their hand clapping or not (i.e. just clapping three notes, not presenting the tone change in clapping).

Analysis 1: clapping by mora or syllable?

The question was: 'which unit of the double structure in the Japanese phonetic system has a stronger influence on *warabeuta* song rhythm re-production by hand clapping?'. Three phrases in two *warabeuta* songs 'Antagata Dokosa' and 'Zui Zui Zukkorobashi' were selected for analysis.

Phrase 1: りょうしが てっぽうで [ryo, u, shi, ga, te, silent(p), po, u, de]: double vowel + double consonant (silent letter)

Phrase 2: ずいずい ずっころばし [zu, i, zu, i, zu, silent (k), ko, ro, ba, shi]: double vowel + double consonant (silent letter)

Phrase 3: いきっこなしよ [i, ki, silent (k), ko, na, shi, yo]: double consonant (silent letter) + extended/added letter

Result: 'Antagata Dokosa'

14 out of 28 students were able to clap the song. The other 14 students either did not know the song, or were unable to re-produce the song by clapping their hands (Table 8.1).

	Bar 7 [せんばやまにはたぬきがおってさ]	Bar 8 [それをりょうしがてっぽうでうってさ]	Last bar [それをこのはでちょいとかくす]
antagata1		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	n.a.
antagata2		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata3		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata4		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata5	extra note at the end→different lyric	♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata6		♪.𝅘𝅥𝅯♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata7		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	different rhythm→different lyric
antagata8		♪.𝅘𝅥𝅯♪.𝅘𝅥𝅯, ♪.𝅘𝅥𝅯♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata9		♪.𝅘𝅥𝅯♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯𝅘𝅥𝅯	different rhythm→different lyric
antagata10		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	n.a. (mistake)
antagata11		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	different rhythm→different lyric
antagata12		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	♩ ♩ ♩
antagata13		♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥
antagata14	two eighth notes at the end→different lyrics	♩ ♪.𝅘𝅥𝅯, ♩ ♪.𝅘𝅥𝅯	𝅗𝅥 𝅗𝅥 𝅗𝅥

Table 8.1 The results of ‘Antagata Dokosa’ song, clapped by syllable/mora rhythm in double vowel and double consonant lyrics

The results of the Phrase 1 clapping rhythm

The Phrase 1, りょうしがてっぽうで in ‘Antagata Dokosa’, was clapped in three rhythmic patterns (as below, Figure 8.19).

	Rhythm patterns	Number of students
1	ryou shi ga tep pou de ♩ ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♩ ♪.𝅘𝅥𝅯 𝅘𝅥𝅯	11
2	ryo u shi ga tep pou de ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♩ ♪.𝅘𝅥𝅯 𝅘𝅥𝅯	2
3	ryo u shi ga te p pou de ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♪.𝅘𝅥𝅯 𝅘𝅥𝅯 ♪.𝅘𝅥𝅯 𝅘𝅥𝅯	1

Figure 8.19 The rhythm patterns for the lyric ‘りょうしがてっぽうで’

11 students clapped the same rhythm (see the top of the Figure 8.19 above). The first two special morae, double vowel う and double consonant っ, were treated as the latter part of a syllable りょう [ryou] and てっ [tep]. Syllable rhythm was chosen by most of university students. 2 students clapped in the second low rhythm pattern. The first special mora, double vowel, in two separate notes, and then the second one, double consonant (silent character) was clapped as one music note. Only one student clapped for all the mora.

The results of Phrase 2 clapping rhythm

Phrase 2, Zuizui Zukkorobashi ずいずい ずっころばし, was clapped by 14 out of 28 students (Table 8.2).

	Bar1 [ずいずいずっころばし]	Bar 2 [ごまみそずい]	Bar 4 [ぬけたらどんどこしょ]
zuizui1	♩ ♩ … ♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui2	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui3	♩ ♩ ♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui4	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui5	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui6	♩ ♩ … ♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui7	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui8	♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯 …♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui9	♩ ♩ … ♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui10	♩ ♩ … ♪. 𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui11	♪. 𝅘𝅥𝅯 ♪. 𝅘𝅥𝅯 … ♪. 𝅘𝅥𝅯𝅘𝅥𝅯	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♩
zuizui12	♩ ♩ … ♪ ♪	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯
zuizui13	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯 … ♪ ♪	♪ ♪ ♪ ♪ ♩	♪. 𝅘𝅥𝅯
zuizui14	♩ ♩ … ♪ ♪	♪. 𝅘𝅥𝅯♪. 𝅘𝅥𝅯♩	♪. 𝅘𝅥𝅯

Table 8.2 The results of ‘Zui Zui Zukkorobashi’. syllable/mora in double vowel and double consonant

Phrase 2：mora=syllable in double vowel （in zuizui zukkorobashi）二重母音（ずいずいずっころばし）

There were six rhythm patterns evidenced for Phrase 2 from ‘Zui Zui Zukkorobashi ずいずいずっころばし’. Pattern 1 and 4 in Figure 8.20 were the most popular among students. Four students clapped the phrase in the rhythm pattern 1 and 4. Two students clapped the rhythm in pattern 2. The rest of the patterns were clapped by one student each.

	Rhythm patterns	Number of students
1	zu i zu i zuk koro ba shi	4
2	zu i zu i zuk koro ba shi	2
3	zu i zu i zuk koro ba shi	1
4	zui zui zuk koro ba shi	1
5	zui zui zuk koro ba shi	4
6	zui zui zuk koro ba shi	1
7	zu i zui zuk koro ba shi	1

Figure 8.20 The results of ‘Zui Zui Zukkorobashi’

The differences in the clapping rhythm seemed to be caused by the pitch moving. The difference in the first half was caused by pitch movement. After the game, the students (as a listening audience) noticed the different rhythm patterns in the clapping. They stated that the difference was caused because of differences in singing pitch. When the first two morae were sung at a different pitch, they were clapped in dotted rhythm, while when they were sung at the same pitch, they were clapped as one quarter note.

Phrase 3 'いいっこなしよ'：double consonant (= the silent note っ) and added vowel in 'Zuizui Zukkorobashi'

The double consonant (=the silent note 促音っ), the added vowel (産み字 'なしよ'), the ending styles of phrases [フレーズの始まる感や終止感] were analyzed in Phrase 3.

	Rhythm pattern	Number of students
1	i ki k ko na shi yo	3
2	i ki k ko na - - shi yo	1
3	i ki k ko na shi yo	1
4	i ki k ko na shi yo	2
5	i ki k ko na - - shi yo	3
6	i ki k ko na - - shi yo	2
7	Mistakes	2

Figure 8.21 the results of the Phrase 3 clapping rhythms

Two out of fourteen students produced very inaccurate clapping of this Phrase 3. They seemed to be confused as to how to clap the rhythm tthat hey had remembered. The double consonant (= silent character 'っ') was produced as a rest by 5 students, and a dotted eighth notes by 7 students. The silent letter 'っ' was sung in a vowel 'i' sound by students when the students sung the song together after the guessing title game. Some of the students stated that it was strange to sing in vowels, but some said they did not even notice that they sung the silent letter as a 'vowel'.

The last three morae (na shi yo [なしよ]) were variously produced with one extra note or some additional notes by six students. The students (including one student's extended ending style) is produced with two additional notes in the rhythm below. This rhythm pattern reflects the pitch movement.

This pattern was the last half of rhythm pattern 2 and 5. And also very similar to the pattern 6 in Figure 8. 21.

Another 12 students produced three mora in three clappings, but in two different length notes. 6 other students produced in three held notes, and another 6 students produced in three quarter notes (as below).

(6 students)

(6 students)

This difference was caused because the end of the song, or section of song, was often sung at extended length, while keeping the same rhythm pattern.

Summary: Different singing styles were reflected?

From the results of the Phrase 1 analysis, a bias towards syllable over mora was demonstrated. However, this was only found with Phrase 1. Results from the analyses of the other phrases did not show any difference.

From observations of the students singing and clapping during the study, and talking to them afterwards, it could be summarized that:

(1) to use morae or syllables may depend on the tonal pitch movement;

(2) there was no tendency to use mora or syllable as a unit in case of special morae;

(3) basically, the amount of these special morae was much less than the other mora.

Therefore, it could be considered that the mora is the principal unit of *warabeuta* rhythm. However, it is necessary to check the relationship between tonal pitch movement and the rhythm, in case of the use of special morae. When pitch moves, the mora structure is stronger, and a special mora may take one musical note. A double consonant (silent character) is also pronounced with a closed vowel to form one tone. When the pitch movement has not coincided with the special morae, the syllable structure would be stronger: each music note being sung by a syllable, not mora. Double consonants (silent notes) are performed as a rest. Double vowels, long vowels and syllabic nasals were weakened to be a part of a syllable.

8.3.2 Re-production of the dotted rhythm (ratio of dotted note and the following note, 2:1 or 3:1?)

Focus 2：the actual ratio of dotted rhythm

The ratio of actual length of the dotted eighth note/quaver and the following sixteenth note/semi-quaver in "dotted rhythm" were calculated to discover the actual re-production rhythm. In the music score, the rhythm was notated in different ways, such as dotted rhythm (3:1), triplet (2:1), or equal rhythm (1:1), with a signage for 'swing' rhythm. But in music performance, it has been produced in 1.8: 1 ie. virtually as a triplet, as stated by music perception researchers (Hoopenlf et. al., 1995; Sasaki et. al., 2002).

The recordings of the hand-clapped *warabeuta* rhythm sound files were analyzed using *WaveSurfer* 1.8.5 software, and the IOI were calculated. From the two *warabeuta* songs "Antagata Dokosa" and "Zui Zui Zukkorobashi", phrases which consisted of repetitive dotted rhythms were chosen for analysis to see the ratio resulting from the actual length of each note. The phrases were analyzed to see whether any differences in game style or playing motion effected the production of the song rhythm by hand clapping.

Lyrics for analysis

The ratio of dotted rhythms from two *warabeuta* songs were analyzed.

•"せんばやまには　たぬきがおってさ"

sembayamaniwa tanukigaottesa

（from a bouncing ball game song "Antagata Dokosa" あんたがたどこさ）

•“たわらの ねずみが こめくって ちゅう”

Tawarano nezumiga komekuute chu

（from a hand/finger play game “Zui Zui Zukkorobashi” ずいずいずっころばし）

Result: the actual ratio of the dotted rhythm

No significant differences were observed between two songs (t-test, t=0.46, not significant). The mean ratio of the phrase from “Antagata Dokosa” was 1.82:1, and the mean ratio of the other song “Zui Zui Zukkorobashi” was 1.80:1 (figure 8.22).

Antagata dokosa	1.82 : 1
Zuizui zukkorobashi	1.80 : 1

Figure 8. 22 The results of the analysis into the observed ratio of clapped rhythms

Two main findings were observed:

- Small different body movement in games did not effect the reproduction of the song rhythm by hand clapping;
- A difference in the ratio of actual IOI length was not found in hand clapping. The dotted note rhythm was produced in similar ratio in both songs.

It could be that the same hand clapping task for both songs made it difficult to reflect the different rhythm caused by the game’s body motion. There are various methods of

notation for both songs, but the rhythm of the songs are quite similar, often perceived as being the same by many people. A lack of the experience with playing games while singing *warabeuta* songs could be an influencing factor on the results (an opinion from discussion of the findings withother university teachers).

8.3.3 Summary

For the participant university students, the principal phonological unit for *warabeuta* rhythm appears to be the mora, not the syllable, although the students were not familiar with the *warabeuta* style music rhythm. During the reproduction of the *warabeuta* song rhythm by hand clapping, or reproducing the *warabeuta* song rhythm from memory, their rhythm patterns were different on some special morae. And this was also seen to happen where the pitch moved with the melody.

Dotted rhythms were clapped in approximately 1.8: 1 rhythm in both phrases extracted from the two songs. This ratio is often perceived as 2: 1 rhythm by people, according to some music psychology studies (Nakajima, 1984; Gabrielson, 1974). Although the dotted rhythm was clapped in approximately an 1.8: 1 ratio in *warabeuta,* where the rhythm could be notated in various ways.

New tendencies were not found in the participating students' hand clapping of *warabeuta* rhythms. It could be said that the university students who had not grown-up with *warabeuta* songs in their childhood, could still perceive and reproduce *warabeuta* song rhythms, so reflecting the native rhythms in the Japanese language. The results support some findings of former studies of *warabeuta* rhythm (e.g. Koizumi, 1984). Special morae were treated as one independent music tone when the pitch moves.

For further study

Further questions arise: (1) how do university students present rhythms new to them, or perform with unknown *warabeuta* lyrics; (2) how can the rhythm of the nasal tone ん, double consonants っ, double vowels be presented; (3) do the 5-7, 7-5 poetic rhythm (seven-and-five syllable metre [七五調] and five-and-seven syllable metre [五七調]) in Japanese have strong effects?; and (4) is dotted rhythm preferred to equal-timed ?

The results show that the mora, and not the syllable, is perceived to be the principle unit constituting the *warabeuta* rhythm, just as in the Japanese language. And the results also show that a pitch change could influence the independence of special morae, such as silent characters, and long vowels. However, in this study, the pitch was not a focus for analysis. Therefore, to make it clearer, further analysis is needed to establish whether pitch change could be the principal reason for these special morae to be treated as independent mora, or as a part of syllable (not matter whether the rhythm is based on mora or syllable units).

In this study, the participants (university students) were asked to reproduce *warabeuta* rhythm by memory. And audiences were also asked to guess the title of the clapped songs from memory. The rhythms of *warabeuta* alongside any memories of university students were analyzed. Some students learned the *warabeuta* songs from Western style music notation. Some students learned them from playing games with other children in their childhood. Either way, the *warabeuta* songs they had learnt were internalized to reproduce the focus rhythm. And the clapped rhythm was just the same as the language rhythm. It had both mora and syllable units. The mora was the basic unit of the rhythm, although in children's songs, especially in *warabeuta* songs, special morae are often used. So it could be concluded that the language rhythm has the priority in deciding the *warabeuta* rhythm, as reported by Koizumi (1984, see Figure 8.1). The

second influence on the rhythm of *warabeuta* is the song itself, according to Koizumi. And the results of this study support this finding as well. The special morae such as silent characters and long vowels could be sung as an independent mora or a part of a syllable. The appearance of pitch movement influenced whether it was sung as a mora or a syllable. The design of the song itself influences the rhythm to be either mora-based or syllable-based. The third factor, in Koizumi's study (1984), for the perceived rhythm of *warabeuta* was body movement. In this data, however, a difference between a bouncing ball game song "Antagata Dokosa" and a finger/hand play game song "Zui Zui Zukkorobashi" was not found. It may be that the results were like this because the movement task for the participants was hand clapping, not the actual bodily movement normal for the games.

Chapter 9 Discussion

9.1 Introduction

According to the Ecological Systems Theory (Bronfenbrenner, 1979) and the Russian Dolls Model (Welch, 2006), environment has a strong effect on young children's general and musical development (Chapter 3). A child's sound world begins in its mother's womb. After birth, its world extends from the nestled arms of its mother (or a caregiver), to other family members, close friends, and to the outside world. Occurring at such an early stage, the mother's culture has a powerful effect on a child's later acquisition of culture. Mother tongue has a strong effect too, forming the child's schemata of culture. This is because language in interwoven in the enculturation process. This formation of the schemata for speaking and singing also receives a strong influence from the mother tongue. This applies not just to young children, but it is also apparent in an adult's composition of instrumental music (Patel et. al., 2003). It is also the case that songs and music reflect the rhythm of the words of the native language, as has been shown in previous studies (Patel and Daniele, 2003; Sadakata, 2005). Therefore, a mother's voice while cradling a baby, her speaking, singing and rhyming, will greatly affect the child's formation of language and music rhythm. With additional growth, i.e. the exchange of words with friends and family, conversations, singing and music play, these influences can further affect the formation of culture within the child. Before the child begins to sing, the rhythmic schemata of the culture's songs are already being shaped in the child's mind by the mother's singing and her speaking with the child. As the child comes to sing together with others (e.g. family and friends), it could be further

embedded within their own specific culture, more strongly reflecting the influence of the rhythm of the parent language.

In the case of Japan however, this process is culturally more complex, because of the fact that common music in Japanese society has adopted a predominantly Western style, with older, traditional Japanese music (much more related to the Japanese language) being sidelined. As a result, a kind of 'cultural twist' can be heard in this Japanese interpretation of Western music. Since the Meiji era, "Westernization" has been the policy of the government in Japan, with music being one of the targets of this Westernization process (Watanabe, 2010; Naito, 2005; Chiba, 2007; Ishii, 2007; Yasuda 1993; Okunaka, 2008). The music education of the United States at that time became a model for Japanese music education in schools (Chiba, 2007; Yasuda 1993; Okunaka, 2008). Therefore, a German-based music education system became its foundation because of its earlier influence on the USA prior to the importation of the US conception of music education. For example, according to studies of early song collections published in Meiji era textbooks, it was necessary at the beginning of a music class to teach children to sing in the correct Western music scale (Chiba, 2007; Okunaka, 2008). In other words, modern music education in Japan commenced with the aim of teaching children to sing "do-re-mi" at the correct pitch. At this time in the West (at this educational stage), emphasis was probably neither placed on rhythm nor pitch individually, with singing at the same time in a group being the primary focus. In other words, it could be considered that the Westernization of Japanese music placed a greater emphasis on collective music making. This introduction of Western music meant an importation of key muical features in the repertoire, such as pitch and melody, whilst inadvertently retaining Japanese language-based rhythm. This rhythmic tendency would later become something of a handicap for Japanese musicians who aspired to play in a

true Western style when they became adults. Chapter 1 mentioned the tragedy of musicians who could not escape from this spell of "Japanese-ness" in their musical performance. For a long time, it was considered that an accomplished performance had to equate with an authentically Western one, with the exhibition of Japanese-ness in music expression concomitantly being considered poor. Therefore, people considered study abroad in Europe or the United States as essential to establish themselves as professional musicians. It was not just to study music, but also to live in the home of Western music, to experience the air of the country, to eat the food, walk the streets, and to speak the language. All were thought useful to greater assist the musician in achieving a more authentic Western-style performance.

Referring back to the language problem here, the influence of spoken language rhythm on culture and music is very important, especially for the Japanese. People hear and absorb the rhythm of the spoken word (as infants) even before they are capable of speaking a language, and they reproduce this rhythm all the time in their speech, from the moment of their first childhood utterances (Mampe, et. al., 2009). A child will experience continual input and output of native language rhythm as it grows up, and the rhythm of the Japanese language is very different from Western languages. In the classic typology of language rhythm, Japanese is classified as a mora-timed rhythm, which is different to stress-timed rhythm, such as German and English. The syllable-timed rhythm of the French language also has a different character, with the phonological unit being as different from English as the Japanese (French has the syllable as a basic unit of rhythm, Japanese has the mora). However, the rhythm of French is closer to English, as revealed by a study of French and English composers (Patel and Daniele, 2003). The sense of rhythm in Japanese traditional music is different to Western music and is exhibited metrically by the contrast between the weak beat and

the strong beat. The Japanese rhythm style is also strongly influenced by the words of the Japanese language, as Koizumi stated in his study (1984).

So, there is something rhythmically "incorrect" about a Japanese language-like music performance of Western music. But music education in Japan has subsequently succeeded in training its professional musicians to fix this problem. For example, in Ogushi's study (2002), only Japanese professional pianists were able to play the dotted rhythm of Mozart's piano sonata differently from the professional pianists of other countries such as Europe and the United States. Dotted notes were played longer than the score timing by the European and United States pianists, while Japanese pianists played a tone length ratio closer to a more accurate musical score than the other pianists (3:1). It is probably ingrained in the body of a Western pianist (as a rhythm), to take a longer note than is required with dotted rhythm, while Japanese pianists have consciously had to master playing in the correct rhythm. As evidenced in Ogushi's study (2002), the impact of native language on musical rhythm is considered to be very great.

Musical activities, especially singing, have been incorporated into the kindergarten and nursery curriculums of Japan. There is the influence of native language rhythm on rhythm itself in composing songs. There is another influence of mother tongue in the actual singing rhythm of children, who learn by copying and remembering by ear the rhythm of songs. As a child grows, rhythmic behaviour develops from an ambiguous mumbling rhythm to a clearly reflected rhythm (inherited from their native language) as illustrated in previous literatures reharsed at the beginning of this thesis.

9.2 Main fieldwork findings

9.2.1 Chapter 5 & 6: Analysis of children's actual singing

The nPVI (normalized Pairwise Variability Index) concept was applied for the first analysis on children's actual singing rhythm. The results of the analysis of "Twinkle, Twinkle, Little Star" in duple time rhythm show that there was a significant difference between Japanese and English children in the nPVI values at five years of age. English children's mean nPVI value was higher than that of the Japanese children, although they sang the same song where the rhythmic pattern was based on repetitive duple time rhythm, successive quarter notes rhythm. This tendency was the same as in the languages. From this result, it could be said that the children's actual singing has the same rhythmic character as their mother tongue at the age of five years. English children's singing is more varied in rhythm, while Japanese children's singing is more stable, reproducing repetitively the same length of notes. However, at the age of three, the results showed an opposite tendency. The three years old Japanese children's singing nPVI value was higher than English children of the same age, though it was not significant. And there was a big difference between Japanese three and four and five year olds in between Japanese children. nPVI values were higher in the three years old group compared to the four and five years old groups. It suggests that Japanese children's singing rhythm was less like the language rhythm when they were three years old, but becoming more native language-like as they grew. The singing became language-like rhythm by the age of four. From the results it could be said that the phonetic structures of lyrics in Japanese and English were very different; therefore the difficulty for the children to produce the rhythm in singing also was different, and the process of the development in singing rhythm and language was also different. The age

that the language rhythm appeared in children's singing was also different. The findings supports the results of Grabe, Post and Watson's study (2000) that French mothers and four years old children's speaking rhythm is the same, but English children's speaking rhythm is still different than the mother's at the same age.

An analysis of "If You're Happy and You Know It" in dotted rhythm shows the difference in dotted rhythm singing. Three year olds Japanese children's nPVI values were higher than the five year olds. It was nearly a statistically significant difference. The data indicate that Japanese three year old children could sing the 3:1 ratio dotted rhythm more precisely than the older children, the implication being that as children grow, they begin to sing the dotted rhythm with a more Japanese language like rhythm. A dotted rhythm is more commonly used in Japanese (see chapter 7 study). Perhaps Japanese children get more used to the rhythm than English children. From the results of three year old groups, it looks like Japanese children were more accurate in reproducing the rhythm in singing. It may be that difficulty and proficiency are different between Japanese and English. From the further analysis on the dotted rhythm singing, the ratios 3:1, 2:1 and 1:1, the mean length of dotted notes were all significantly different between Japanese and English children (3yo JPN>ENG, 4 and 5yo ENG>JPN). A language rhythm influence appeared in the four year olds, but the tendency for the singing rhythm was opposite of the language rhythm for the three year olds.

To sum up from these results, it can be concluded that there appears to have been an influence of mother tongue on young children's rhythmic behaviour in singing. The different languages could bring different tasks to children in singing the same song. For example, putting words in a certain fixed timing could be the task for English children, while putting each mora in a (boucing) musical beat is the focus for Japanese children.

The Japanese language can be considered as more digital-like than English. It is like a succession of '1' and '0' numbers, with each of the numbers occupying the same duration of time. Thus the fitting of morae to music notes, or making mora-based song lyrics fit into expressive music phrases, can be a difficult process. The Japanese mora is not as flexible as the English syllable. It consists of one or two, rarely three letters (or phonetic units, such as vowel and syllable). Therefore, each music note will contain a similar amount of a phonetic unit, CV or V, with which it is easy to form an equal-timed rhythm. For example, a simple singing task, such as putting each phonetic unit on a music note, is easier for Japanese children than English children. For Japanese children, singing and placing each mora on each music note in proper time (i.e. on the beat) is an easy task. However, such an easy task can be a bit boring; therefore, it may be that children use a dotted or swing rhythm to express their happiness or joy, or other feelings in their singing. The rhythm may also be dictated by a lyric containing special morae, or the body motion of games as well. The setting of a rhythmic schema likely occurs rapidly by singing many songs with the same rhythmic pattern.

For English children, used to applying various lengths to each phonetic unit, singing to a fixed music note/beat was difficult. In fact, many three year old English children failed to sing the target songs while recording. They needed time to practice and get used to the rhythm. It is possible that the results occurred because the children were concentrating too much on properly annunciating the phonetic units in proper time. Because the task was too difficult for the English children, they concentrated on putting each phonetic unit on a music note in a correct timing, and in this they succeeded. It is conjectured that this is why English children's nPVI values were lower than for Japanese children, especially the youngest three year old children. As the children get older, and they became able to sing in time (on the beat), singing each music note

without conscious effort, they start to sing as they speak. They let their language rhythm appear in their singing rhythm. Examined as a process of acquiring singing skill, there was a stage where the children's singing rhythm became very equal-timed (unlike their native language rhythm), but after this stage, the children start to sing in their native language-like rhythm. There is a plasticity of rhythm performance, which can easily move from equal-timed rhythm to swing rhythm in 2:1, then dotted rhythm in 3:1.

9.2.2 Chapter 7: An analysis on printed music of Japanese and English children's songs

The nPVI values of n= 75 Japanese versus n=67 English songs, involving n=182 vs n=124 phrases of printed music were analysed. The results indicated that Japanese songs had a mean nPVI value of 79.2 compared to a mean nPVI value of 64.6 for the English songs. This finding contradicted that expected from the language rhythm, was different to that reprted in previous research by Sadakata (2005), and Patel et. al. (2003). These nPVI music results originated from the difference of commonly used rhythms in Japanese and English children's songbooks, such as a 3:1 ratio dotted rhythm in Japanese songbooks, whereas a 2:1 ratio in 3/4 and 6/8 metre in English songbooks was more commonly evidenced.

The Japanese language does not 'bounce' as such, but baby speech and children's song lyrics often contain special morae which are pronounced as a part of syllable, as Koizumi explained in his study (1984). Lots of these songs are sung along with a game and played with a bouncing body movement. Songs with a bouncing rhythm are usually cheerful and are reported to be preferred by children in Japan. And these were written in a 3:1 ratio dotted rhythm. On the other hand, the sound of the

English language naturally bounces compared to the Japanese language. Therefore, it may naturally form a 3/4 or 6/8 triplet rhythm, rather than an emphasized dotted rhythm.

9.2.3 Chapter 8: Analysis on reproduced *warabeuta* song rhythm by university students hand clapping

From the analysis of university students' reproduction of *warabeuta* rhthms by hand clapping rhythm, it was found that the special morae in phrases (double vowel, double consonants) were not clapped as one musical note in some cases. These were treated as a part of a syllable instead of mora. So, a student's hand clapping was basically related to each mora, but some were by syllable.

The results were as follows;

- Double vowels were not clapped when pitch change had not occurred; the special morae were clapped as one tone;
- Syllabic nasals were treated as a rest (no clapping);
- In terms of a traditional ending style: there were various patterns for each song. Some of the students were not confident to produce this part;
- Dotted rhythms were reproduced in the ratio of 1.82:1 in "Antagata Dokosa", and 1:80:1 in "Zui Zui Zukkorobashi".

9.3 Commonalities and differences between the fieldwork findings (re 9.2)

A language-rhythm classification index, nPVI, was used for the analyses of children's actual singing rhythm timing (Chapter 5 and 6) and printed song materials (Chapter 7). From the results and discussion of the analysis, different developmental processes between Japanese and English language were implicated. In Japanese, it is easy to adapt/put each mora on musical notes and beats. This is because the configuration of each mora is simpler than syllables in English. Each mora consists of fewer phonetic elements than an English syllable. Therefore, each musical note and beat are likely to fit more easily into equivalent lengths, which make the music rhythm more stable and equal-timed. Also, there are specific rhythm patterns, which are often used for children's songs. There are more Japanese children's songs written in the same dotted rhythm than in English. Children also like to sing songs in dotted rhythm when they are cheerful. Therefore singing in a particular rhythm repeatedly makes Japanese children able to acquire the focus rhythm earlier than English children. That explains the results of the Japanese three year old children's singing rhythm.

9.4 Other similarities and differences

Theme 1: Behaviour from the results of 3-5yo children and 19-20yo adults' analysis. How they behave musically in singing and clapping.

The rhythm of Japanese five year old children's dotted rhythm singing trended to be the same as for the 19-20 year old adult university students' reproduction in dotted rhythm of *Warabeuta* by hand clapping. The three year old Japanese children's singing showed

however, more preference for dotted rhythm, although it was sung nearly in a 2:1 ratio. The data suggested that the behavior of three year old children as being closer to the reproduction of dotted rhythm than the five year olds. As children grow and develop, they get used to the dotted rhythm the same as adults, and a conscious awareness of the rhythm fades, resulting in a similar rhythm to their familiar mother tongue rhythm, which is an equal-timed rhythm in Japanese.

In English children's actual singing rhythm, three year old children's singing gets closer to an equal-timed rhythm, whilst five year old children's singing shows a higher nPVI value. This suggests that the lengths of successive tones were more varied in the singing of the older children, which shows the same tendency as their mother tongue rhythm. As English children grow, the rhythm of their actual singing comes to demonstrate stronger effects of the mother tongue rhythm.

Taken together, these results suggest that as they grow older, both Japanese and English children have the same tendency to be more influenced by their mother tongue's language rhythm in their rhythmic singing behaviour.

Theme 2: The music structure in songbooks and, different tendencies in Japanese and English children's songs

The songs which were used for the analysis of children's actual singing (Chapter 4) were two common songs: "Twinkle, Twinkle, Little Star" and "If You're Happy and You Know It". The two songs are sung universally and are familiar to both English and Japanese children. "Twinkle, Twinkle Little Star" consists of successive eighth notes in a repeating rhythm. Contrary to that, "If You're Happy And You Know It" consists of repetitive dotted note rhythm.

Two *Warabeuta* songs such as: “Antagata Dokosa”, and “Zui Zui Zukkorobashi” were chosen as the song material for analysis in the university student’s re-production of *Warabeuta* rhythm by handclapping (Chapter 8). Both songs were sung in a dotted bouncing rhythm, but there are various versions of music notation for both songs, because originally *Warabeuta* songs were transmitted aurally, without music notation. In those music notations, some were written in dotted rhythm, some were in 2:1 swing rhythm, and other were written in an equal-timed rhythm using successive eighth notes. These music scores were collated from all over Japan by researchers seeking to transcribe *Warabeuta* songs decades ago. Their intention was to make their music notation as close as possible to the real performance. The actual singing of the song at that time and place must be equal-timed, not like contemporary recorded and published music. The two songs were sung in dotted rhythm – at least on the CDs, and in other recorded music sources published as music scores after World War Two.

Three of the the four songs above, “Twinkle, Twinkle, Little Star”, “If You’re Happy And You Know It”, “Antagata Dokosa”, and “Zui Zui Zukkorobashi” were usually sung in dotted rhythm, the exception being “Twinkle, Twinkle, Little Star” which has an equal-timed rhythm. This ratio bias appears to reflect the ratio of the dotted rhythm used in infant songs in Japan. It was found that the nPVI value of infant songs in Japan was higher than in English material in the results of rhythmic analysis of Japanese and English children’s songbooks based on printed publications – Chapter 7. However, analysis revealed that both Japanese and English children’s songbooks did not reflect the rhythm of the language in terms of nPVI data. The opposite tendency for nPVI values appeared to derive from the extensive use of 3:1 rhythm in Japanese children’s songs. Furthermore, there was more of a 2:1 swing rhythm in 6/8 and 3/4 meter in the English children’s songbook, which is rare to see in Japanese children’s

songbooks. The results of this study were different from those reported by Sadakata et. al. (2005) and Pate and Daniele (2003), where similar tests were conducted with adults. The impact of language rhythm on music rhythm is not reflected in a straightforward fashion, when the element of the "child" is taken into account in musical terms.

Theme 3: Music and Behaviour, dotted rhythm 3:1 and swing 2:1

The bias in the use of the 3:1 ratio dotted rhythm and 2:1 ratio swing rhythm generated the difference between Japanese and English children's songs (Chapter 7). There is a tendency for the rhythm of young Japanese children's songs to bounce more than their English counterparts, and the English rhythm bias of infant songs tends more closely towards the repetition of similar length beats. This indicates that a "reverse trend" was observed in Japanese and English infants' songs relative to native language and rhythm. In theory, if the rhythm of the native language was to be reflected in their music, it would surely be the Japanese children's songs (in 1:1 equal timed rhythm) that should reflect the equal beats of the Japanese language, and English children's songs that should have a more random rhythm than that of the Japanese. In other words, the rhythm of 2:1 in the English children's songs is a rhythm which reflects the rhythm of the English language.

However, when the element of "child-friendly" music is applied, Japanese children's songs do not adhere to a language-like, equal-timed rhythm, but more closely resemble the rhythm of English songs. The 3:1 ratio dotted rhythm notation in Japanese children's songs has become bouncy, which - as mentioned above - is likely determined by the joyful mood of children (Japanese children's songs including the elements of play and fun). The successive equal-timed Japanese language rhythm is changed by the characteristics of the lyric of the children's songs (which are repetitive terms in baby

talk and word play) and the social play context. The basic unit of language (mora) is changed to syllables, and a bouncy rhythm is also caused by the bodily movement of the play accompanying the song. To recreate the state of children singing while having fun, the song transcribers appear to have chosen a bouncy dotted rhythm for children's songs. Therefore, it is hypothesis for why the Japanese children's songbook contains many 3:1 ratio notation rhythm songs. From these results, it was revealed that the rhythm characteristics of the Japanese language were not reflected in many young children's songs. Language characteristics were latent due to the priority set on children having fun and enjoying play while singing.

Conventions in music notation can be considered as another reason for the predominant use of the 3:1 ratio dotted note rhythm in Japanese children's songs. The 3:1 rhythm in actual reproduction timing is often reproduced closer to the 2:1 ratio. However, a certain discomfort is experienced in producing the rhythm of Japanese, as in the use of the triplets grouping rhythm. As Koisumi (1984, 1994) and former poetry researchers (Bekku, 1977; Sugaya, 1075; Kindaichi, 1988; Nakayama 2001) indicated, it is better thought of as a set of captures that are comparable to the sound of the two mora/letters being aligned to the rhythm of the Japanese sense. Dotted rhythm has become the standard notation for transcribing the practice of a bouncing Japanese rhythm. According to the result, the English children's songs reflect the rhythm tendency of the language, while Japanese children's songs are known to differ in rhythm from the rhythm of spoken Japanese.

Theme 4: Cultural explanation for why people do not sing what is published (linked to chapter 1, 2)

There are reasons to explain, why people do not sing what is published. For young children, songs are usually first experience aurally, not by reading music notation. Learning for children is mimicking other people, such as their mother, caregiver, sisters, brothers and friends. And once the song has parted from the music notation, the activity of "singing" is very much similar to that of "speaking". Children remember songs by ear as they hear other people sing them. This process of learning is exactly the same as speaking.

Arguably, the task of singing for Japanese children is a form of psychological hurdle that will be higher than for English children. Because the music is in Western style, which is different from their own mother culture, it is a departure from their native language rhythm. However, perhaps luckily for Japanese children, the phonetic system itself is simple compared to the English language. Also, because there is so much of the same dotted rhythm used in Japanese children's songs, children can easily get used to the bouncing rhythm. Therefore it is easy to manage for Japanese children to sing in a more correct or closer to the music notation rhythm than English children, especially singing in the dotted rhythm.

9.5 Summary

The findings of the three studies in this thesis supported the existence of a 'cultural twist' in the music circumstances in Japan. Singing Western style songs with their different language elements brought different pathways to young children's development of musical rhythm. For Japanese children, the first pshychological task of singing is focused on producing musical rhythm in fixed metre; producing singing rhythm with

natural language rhythm emerged afterwords. As a result, Japanese three year olds' singing rhythm was more precice than the same age English children, and five year old groups of both Japanese and English children's singing rhythm was closer to their mother tongue rhythm. The 'cultural twist': singing foreign music in one's mother tongue, caused the opposite tendency in singing rhythm and language rhythm. Furthermore, the findings from the second study (analysis of childen's printed songs) also demonstrated the influence on mother tongue. Japanese children's songs, which were composed by Japanese composers, had a different rhythm character than English children's songs. The intensive use of dotted rhythm in Japanese children's songs assisted Japanese children in getting used to foreign style music. It was one of the easiest ways for Japanese children to sing in a western style with Japanese lyrics. Music in Japan has been westernized and globalized, but a certain Japanese-ness still remains, especially in the rhythmic behavior of music performance. Evidemce seems to suggest this is the result of the 'cultural twist' brought about by the influence of the Japanese language rhythm.

It is likely that almost all cultures will have experienced some impact from other cultures as part of the process of globalization. However, there will always remain some aspects of the native culture that will be inherited and passed on to subsequent generations despite the influence of foreign cultures. In the sphere of the arts, national music around the world is under the constant influence from the West, and there are some cultures where Western music has taken over the mainstream completely. However, in many cases, the influence of the mother culture is still discernible in a nation's music, which may appear only outwardly Westernized. In this study the investigation has been on the links between culture, as expressed in speech, and its relationship to singing rhythm.

Commonly, “music” now means Western style music for most Japanese people living today. In fact, most of the music one hears everyday in Japan is played on Western instruments because of this Westernization of its music culture. Probably some effort is required to find opportunities for listening to, or playing, Japanese traditional music. Many current Japanese university students seem unlikely to distinguish or notice the “foreign-ness” of Western style music in Japan, so culturally accustomed are they to hearing Western style music (including J-pop which is composed and performed by Japanese musicians). They have become much like Western people. In TV broadcasts and on the Internet, students can easily listen to singers’ performances from all nations, or from any genre or contemporary musical era. Live concerts by Korean pop groups were very popular some years ago in Japan, and the K-pop singers sung using Korean, English and Japanese lyrics. Some Black American male singers have become well known for singing enka songs, and various old and new anime songs have been covered by musicians from several different countries. Not only human voices, but also artificial “vocaloids” (for example Hatsune Miku [初音ミク]), have been popular on YouTube and other video streaming websites, singing various genres of music. This internationalization of music culture is also one of the reasons why modern university students do not seem to care so much about the nationality or cultural background of the musicians that they listen to. In my lectures at the university, some of these students seemed very surprised to learn of the cultural gap (between Western and Japanese music), which once used to be so obvious, even comparatively recently. When I talk about Japanese popular music history with them, they found it interesting to learn of the big difference that exists between their own and the older generation’s sense of perceiving and producing music. This strong tide of cultural change has thus been reflected in the history of Japanese pop music. For these

same university students, Japanese traditional music such as Kabuki or Noh, is almost completely unfamiliar, sometimes barely recognizable as music. Regarding *warabeuta*, there were students who had never heard of the term, though they had some experience of singing *warabeuta* songs in their childhood. It is interesting to note that these students were on a course studying to be nursery and kindergarten teachers, meaning that one day they would be required to sing and teach *warabeuta* songs to children. Surprisingly, there were some students who had never sung or played with *warabeuta* songs at all, only having learned the songs as teaching material for young children in some lectures and classes at the university.

On the other hand, the relationship between language and music has recently become a big focus in young children's language education. A change in government education policy has been to lower the starting age for learning English due the wishes of parents who want their children to learn English from a young age. This desire by parents on behalf of their children has became a big business opportunity for some private English schools in Japan. Not only have English conversation school for adults opened young children's classes, but so also have some music schools, such as Yamaha (and other local schools). In these schools, singing and chanting activities are commonly employed because young children are happy to sing English lyrics with Western music style karoke accompaniments. Native-like pronunciation and fluency in speaking are the students' aspirations. The models for singing practice are recorded by native English speaker accompanied with western style music.

One in four pre-school children in Japan is taking lessons at English schools, according to the Benesse corporation's research in 2007. This is because of the long term recession which has made parents acutely conscious of their children's need for greater English skills to get better job positions. Additionally, English became a

compulsory school subject at elementary schools in April 2011. In fact, there were many students taking private English lessons at the school where I conducted my initial fieldwork in 2005. When I asked their names for recording in Japanese, some of them replied quite happily in English, “My name is ~!”. According to other research by the Benesse corporation in 2010 (http://www.benesse.co.jp/global/news/20101020.html), 40% of kindergartens have some form of English lessons once or twice a week, and 70% of these lesson activities involve singing songs in English. The chanting of English words in certain rhythmic patterns is also a favoured activity in English lessons for young children.

Many parents want their children to start learning English as early as possible (to attain a good level of English proficiency – akin to native speakers if possible), but this has proved a controversial issue due to Japanese educators wanting to prioritize mother language acquisition. However this issue may ultimately be resolved, as Japan’s TV broadcast network, NHK produced two children’s educational programmes at the same time: *eigo de asobo* [えいごであそぼ], meaning literally “Play in English”, and *nihongo de asobo* [にほんごであそぼ], “Play in Japanese”. These programmes were produced side by side with no especial emphasis on ether English or Japanese, eliciting little comment or controversy. This may have been because in the sphere of music, it already being so Westernized, Japanese people did not have any strong partiality one way or the other. By contrast, some controversy occurred (among music educators, teachers and parents) when NHK started to run “Do-Re-Mi’s TV” [ドレミのテレビ], a music program for first and second year elementary school children. The singing style of the lead female singer was very different from that employed in a previous, long-running TV show, which had targeted a similar age group. The new show was seen as a replacement for the old one, and the singer was famous in the R&B genre. This more

contemporary style surprised people and controversy ensued. Up until this time, it had been considered necessary to always sing Japanese children's songs in a style similar to children. Additionally, young children should not sing in English for their music education. Unlike language acquisition, there has been no resistance to Westernization of music. Japanese-ness in music performance has not been considered an important factor in Japanese culture. Nevertheless it was suggested in this study that Japanese-ness in music behavior, as expressed in rhythm, is formed by the influence of mother tongue at a very early stage of childhood development. This could be considered as highlighting a crisis of Japanese-ness in music culture, though it could also be considered a strong point in Japanese music culture as well (with the exception of Western classical music). If children started forming their music behaviour with singing not only in Japanese songs but also English songs, their musical rhythm behaviour would be different. Thus the Westernization of singing rhythm in young children may be advanced with regular English lessons. No one would oppose this progress, because in Japanese society, Westernization has long been considered a good thing in anything related to music (traditional music excepted). This may cause a crisis in musical identity for the Japanese. The results of this study would be very different if the test samples had been collected from children who had been brought up having regular English lessons from a young age. Then there probably may have been no significant difference found between the Japanese and English children.

9.6 Implications for policy and practice

The Japanese music culture has already become very Westernized. Not only professionals but also amateur musicians from various genres possess a high level of

performance skill. Japanese-like music behaviour (including rhythmic behaviour) can nowadays be considered a strong point: a distinctive or ethnic characteristic of their expression. It has become natural in our era for any genre of music to be played in virtually any style, with musicians performing in a globalized world. In such a diverse musical environment, a Japanese-like performance can be accepted as just another idiosyncratic or distinctive style of music (not as something "erroneous" or imperfect). Therefore, this Japanized expression can be considered as a musical culture or a legitimate musical behaviour in its own right.

Recently, the Japanese government began emphasizing the importance of Japanese culture in the national education curriculum for elementary and junior high schools. However, kindergartens and nurseries are excluded. Thus in pre-school, while *warabeuta* songs are often sung, with Japanese drums being tried in some places, generally other activities relating to traditional music, are ignored. This may be because traditional Japanese music is unfamiliar to most adults (including nursery teachers). Actually, in my experience it is difficult to teach traditional music to teachers who do not have any previous knowledge or related musical skills. But fortunately, Japanese traditional music is strongly related to literature. In the past, people let children recite famous stories in a certain rhythm, using melodious phrases, taking songs from *Manyoshu*, *The Tale of Genji*, *The Tale of Heike*, and the Analects of Confucius. It is also possible to start with easier songs, poems, or proverbs for young children. In this way, it is possible to place an educational focus on the vocalization of the Japanese language rhythm. The importance of reciting and chanting traditional Japanese literature were stated by some educators. For example, Takashi Saito produced a series of books and picture books named as "*koeni dashite yomitai nihongo*", meaning Japanese literature for reading aloud, for adults and children. Yoneyama suggested in his book

that vocalic education is missing from the Japanese education system, and reciting and chanting the traditional literature could be helpful for it and to connect music and literature together. Yasuda, the Noh player, also stated the importance of reciting old stories. Saito, Yoneyama and Sato said that the chanting and reciting could be good to develop children's vocal control skills. These recitals of literature can lead to *warabeuta* and song play. Teachers can pay a little bit more attention to the language rhythm, to improve children's speaking and singing behaviour. NHK's TV programme "Nihongo de Asobo" [にほんごであそぼ] can provide us with a good example of these activities. Here, kabuki actors, kyogen players and other traditional performers play different roles in the programme. Traditional literature and poems are recited and sung in a music-like formula. From this programme, children can learn not only traditional culture but good Japanese vocalization. In addition, learning to produce one's voice from the abdomen and building a healthier voice can be additional benefits of these activities. Good vocalization is common in the East and West.

The music activities used in English lessons for young children, such as rhythmic chanting, reciting and singing, could be similarly adopted for vocal-training in the Japanese language as well (for mother tongue learning). The material for chanting and reciting could be stories, poems, and haiku. There are various materials for musical play based on these old stories and poems. This reciting and chanting of Japanese could be good preparation for attempting musical play. Later on, this chanting and reciting could lead to *warabeuta* song play. Group play with the *warabeuta* songs is fun for children, as well as singing to match a rhythm in a group. The rediscovery and re-affirmation of the Japanese sense of language, rhythm, and intonation could be important in retaining Japanese-ness in young children's music behaviour.

On the other hand, using English songs could be the solution to overcoming the difficulty some students have in playing in 3/4 and 6/8 metre. There are many students who are not good at performing 3/4 and 6/8 metre songs and music in Japan, and there are people who are not good at playing dotted rhythms. Teachers must be careful to understand that this difficulty is natural for Japanese students who have not had any formal instrument training or music lessons. Lacking experience with those rhythms, they may need more time than the other students to acquire them. It would be helpful, therefore for teachers to understand the nature of Japanese children's rhythmic behaviour, thus giving them greater insight into student's problems and allowing them to teach in a more effective and appropriate way.

Finally, I would like to conclude that the strong influence of mother tongue on young children's singing rhythm could be a good focus for music pedagogy, and offers potential to improve the character of children's music performance. Recognition of the influence of the mother tongue rhythm in music performance can extend and deepen the knowledge of other cultures' musical character, and lead to further enjoyment of music and its diversity. The findings of this study could offer insights to teachers and mothers and make them more aware of the importance of mother tongue on musical debelopment. I would like them to enjoy singing and speaking to their children in their mother tongue with confidence and pride.

9.7 Limitations

Children's singing is fluid. Some early childhood education experts have said that it is impossible for young children aged three or younger to sing a song with same expression even twice (Imagawa, 2008; Ogawa, 2008). This is because their mood and focus keeps changing, and thus their singing expression can be never be consistent.

However, the data in this study were collected from children singing naturally in their everyday environment, and their development of rhythmic behaviour was caught in the recordings. Though the study was limited to one kindergarten in Japan and one nursery school in England, children's actual singing rhythm (in a natural setting) was analyzed. Especially in Japan, nearly every kindergarten and nursery has a different setting, goals and musical activities. Some consider singing as music education, while others consider it as musical play, even though all kindergartens and nurseries in Japan must follow the same guidelines set for teaching music expression. All the singing data were recorded during Japanese children's play time to best capture the children's singing in a natural environment. Other possible data, such as the children singing non-verbal words "ma" or "ta", could have been researched, but requesting children to learn something new for the data collection would have elicited a much less natural series of responses. Thus it was avoided.

9.8 Further research

Different attitudes and expectations in young children's music development and education were observed during data collection. For example, it is common in Japan for children to start taking private piano lessons at preschool age (3 – 5yo). Even younger children go to Eurhythmic classes or group music lessons. In nurseries and kindergartens, music is considered an important activity integrated into the daily schedule. Japanese children sing many songs each day. Singing activity is not separate from other activities, and children are allowed to sing when they start the day, before teachers start reading a picture book, before starting lunch, before group play, and before going home to say good bye to teachers and other children. On the other hand, in

the English nursery, music was not among the main activities, but sometimes some singing occurred at story time held twice a day, before a lunch time and at the very end of the day. None of the nursery children appeared to be studying a musical instrument, nor were any going to group music lessons. Usually in England, children start music lessons when they enter elementary school. Recently, because of Government initiatives, they commonly take lessons held at school in England, with private lessons being much less common for certain sections of society. As for learning music, the difference in expectations and attitudes that adults hold for children are markedly different between the two cultures. Only language was the focus of his study, but parental influence (as exerted through education) could be another factor in determining children's musical development. This might make for another interesting area of research in the study of young children's musical and singing behaviour.

References

Abe, S. (2006). Utsukushiikunihe. Bunshushinsho: Tokyo. (in Japanese)

Abe, Y. (2002). Warabeutade kosodate nyumonhen. Fukuinkanshoten: Tokyo. (in Japanese)

Akiyama, H. (2008). ‘From "A Survey Concerning Old Nursery Rhyme" to "A Music Educational Theory Concerning Nursery Rhyme"’. Shiraume Gakuen Daigaku Tankidaigaku Kiyou, 44, 63-78. (in Japanese)

Azechi, N. (1998). The Syncopated Pattern: Originated from Weakened Mora in Japanese Pop Songs (the 60’s ~ the 90’s). The 2nd Asia-Pacific Symposium on Music Education Research, Tasmania, Australia.

Azechi, N. (2001). The Development of Upbeat Rhythms in Japanese Popular Songs from 1965 to 2000. The 3rd Asia-Pacific Symposium on Music Education, Aichi.

Bekku, S. (1977). Rhythm of Japanese Language: a four-meter-culture theory. Koudansha: Tokyo. (in Japanese)

Bronfenbrennner, U. (1979). The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. (2005). Making human beings human : bioecological perspectives on human development SAGE.

Cavaye, R. & Nishiyama, S. (1987). Nihonjin no Ongaku kyouiku (Music Education of the Japanese): Shinchosha: Tokyo. (in Japanese)

Chiba, Y. (2007). Do,re,mi, wo eranda nihonjin. Ongakunotomosha: Tokyo. (in Japanese)

Cohen, R. (2007). Creolization and cultural globalization: the soft sounds of fugitive power. *Globalizations*, *4*(3), 369-384.

Dan, I. (1999). Watashi no Nihon Ongakushi. Nihonhousou Shuppankyoukai: Tokyo. (in Japanese)

Davidson, L. (1994). Songsinging by young and old: A developmental approach to music, in Rita Aiello and John A Sloboda (Eds.) Musical Perceptions. Oxford University Press: Oxford. p. 99-130

Davidson, J. W., Howe, M. J. A. and Sloboda, J. A. (1997). Environmental factors in the development of musical performance skill over the life span. Hargreaves, D. J. & North, A. C. (Eds.) The social psychology of music. p.188-208

Davidson, McKernon and Gardner. (1981). The acquisition of song: a developmental approach. Documentary Report of the Ann Arbor Symposium. Reston, VA: Music Educators National Conference p.301-315

Deanda, F. (2004). Nigonjinwa classic ongakuwo dou haakusuruka –Ongakuwa nanigo?-. Gendaigeijutsusha: Tokyo. (in Japanese)

Drake, C., & El Heni, J. B. (2003), Synchroniziung with music: Intercultural differences. Neurosciences and Music, 999, p.429-437

Eimas, P. D., Siqueland, E. R., Jusczyk, P. & Vigorito, J. (1971). Speech perception in infants. Science 22 January 1971, vol. 171. no. 3968, p. 303 - 306

Fassbender, C. (1996). "Infants' auditory sensitivity towards acoustic parameters", Musical Beginnings: origins and development of musical competence. Deliege, I. and Sloboda. J. A. Oxford University Press: Oxford.

Foster-Cohen, S. H. (1999). An introduction to child language development. Routledge: London.

Fujiwara, M. (2005) Kokkano hinkaku. Shinchosha:Tokyo. (in Japanese)

Gen, T. (2008). Youchien Kyouiku Yoryo Hoikusho Hoikushishin no seiritsu to hensen. Houbunshorin: Tokyo (in Japanese)

Gosuwami, U. (2003). Kodomono NInchihattatsu. Shinyosha: Tokyo. (in Japanese)

Grabe, E. and E. L. Low. (2002). “Durational variability in speech and the rhythm class hypothesis”, Laboratory Phonology 7. Mouton de Gruyter, Berlin, New York.

Grabe, E., Post, B., and Watson, I. (1999). The acquisition of rhythmic patterns in English and French. Proceedings of the 14th International Congress of Phonetic Sciences, San Francisco, August, 1999. 1201-1204.

Hannon, E. E. & Trehub, S. E. (2005), Metrical categories in infancy and adulthood. Psychological Science, vol.16, p.48-55

Haraguchi, S., Kubozono, H., and Honma, T. (2002). Onsetsu to mora. Kenkyusha. (in Japanese)

Hargreaves, D. (1986). The Developmental Psychology of Music. Cambridge University Press: Cambridge.

Honma, M. (1982). Warabeutawo sozaitosuru ongakukyouiku: youjikara shougakuseie.

Honma, M. & Suzuki, T. (eds.). Warabeutanihoru Ongakukyouiku asobito gasshou, youjikara shougakuseihe. Jiyuugendaisha: Tokyo. p.86-92 (in Japanese)

Ishii, H. (2007). Seiyouongakukaramita Nippon: haikuwa 4, 4, 4. PHP Kenkyujo: Tokyo. (in Japanese)

Hoopen, G. T., Hartsuiker, R., Sasaki, T., Nakajima, Y., Tanaka, M., and Tsumura, T. (1994). Auditory isochrony: time shrinking and temporal patterns. Perception vol. 24(5) p.577-593

Ishii, T. (2000). Hoikusho hoikushishin kaisetsu. Froebelsha: Tokyo. (in Japanese)

Ishii, Y. (2006). Cultural Identity Observed in the Transition of the Pieces Adopted in Primary School Music Textbooks. Bulletin of Yamaguchi University Kyouiku Jissen center Vol. 22, p.173-183. (in Japanese)

Iwai, M. (1998). Kodomono utano bunakshi: 20seikino Nihon. Daiichi Shobou: Tokyo. (in Japanese)

Iversen, J., Aniruddh, P., and Ohgushi, K. (2004). Perception of Nonlinguistic Rhythmic Stimuli by American and Japanese Listeners, In the proceedings of the 18th International Congress on Acoustic, Kyoto.

Jusczyk, P. W. (2003). Chunking language input to find patterns. Rakison, D. H. & Oakes, L. M. (eds.) Early category and concept development: making sence of the blooming, buzzing confusion. Oxford university press: Oxford.

Kindaichi, H. (1988). Nihongo (jyo). Iwanami:Tokyo. (in Japanese)

Kobayashi, H. & Sasaki, M. (1997). Kodomotachino gengokakutoku. Taishukanshoten: Tokyo. (in Japanese)

Koizumi, F. (1986). Kodomo no asobi to uta, warabeuta wa ikiteiru. Soshisya: Tokyo. (in Japanese)

Koizumi, F. (1984). Nihondentoongaku no kenkyu 2 rhythm. Ongakunotomosha: Tokyo. (in Japanese)

Koizumi, F. (1982). Warabeuta no kenkyu, game songs of Japanese children. Warabeuta kankoukai: Tokyo. (in Japanese)

Kojima, R. (2009). Re-Visioning “Warabe-uta”of Traditional Children's Game-Songs in School Music: A Shift from“Warabe-uta”as Song to “Warabe-uta”as Experience. Memoirs of Osaka Kyoiku University, Ser.Ⅴ School Subjects and Allied Problems, 58(1), p.43-55. (in Japanese)

Kojima, T. (1999). Nihonno ongakuwo kangaeru. Tokyo, Ongakunotomosha: Tokyo. (in Japanese)

Kondo, N. (2001). Nihon no warabeuta. Fukuinkanshoten: Tokyo. (in Japanese)

Kubozono, H. et. al. (1998). Oninkouzou to accent. Kenkyusya shuppan: Tokyo. (in Japanese)

Kubozono, H. (1999). Nihongo no onsei. Iwanami shoten: Tokyo. (in Japanese)

Kuniyasu, A. (1979). Rhythm kyouiku. Kitaoujishobou: Tokyo. (in Japanese)

Kurokawa, K. (2004). Hoikunaiyou "Hyougen". Minervashobo: Tokyo. (in Japanese)

Lecanuet, J. (1996). Prenatal auditory experience, in Irene Deliege, John A.SLoboda (Eds.), Musical Beginnings. Oxford University Press: Oxford. P.3-36

Levitt, A. G. (1993). The Acquisition of Prosody: Evidence from French- and English-learning Infants* Haskins Laboratories Status Report on Speech Research 1993, SR-113, 41-50

Maebara, R. (2006). Amami no warabeuta to asobi, Kagoshimaken no densho bunka. Toshoshuppan Minamikata shinsha: Tokyo. (in Japanese)

Mainichi Shinbun News article. (Mainichi, 2006) ref. on web news: www.mainichi-msn.co.jp/shakai/edu/news/20060526k0000m040165000c.html)

Malloch, S. N. (1999). "Mothers and infants and communicative musicality." Musical Scientiae (Special Issue).

Mampe, B., Friederici, A. D., Christophe, A., & Wermke, K. (2009). Newborns' cry melody is shaped by their native language. *Current biology*, *19*(23), 1994-1997.

Mang, E. (2003). Singing competency of monolingual and bilingual Children in Hong Kong. In L. C. R. Yip, C. C. Leung, & W. T. Lau (Eds.), Curriculum Innovation in Music, Hong Kong: The Hong Kong Institute of Education, p. 237-242.

Mang, E. (2003) 'An investigation of vocal pitch behaviours of Hong Kong children'. Bulletin for the Council of Research in Music Education, 153/4, p.128–134.

Mang, E. (2006). The effects of age, gender and language on children's singing competency. B.J. Music Ed. 2006 23:2, p.161-174

Masataka, N. (1993). 0saijiga kotobawo kakutoku surutoki koudougakukarano approach. CyuohKouronsha:Tokyo. (in Japanese)

Minami, Y. & Murao, T. (2001). Cross-Cultural Comparisons in the Movement of Clapping Time, Warabeuta Jiyuuseishou niokeru pitch no touitsuka to undou beat no Doukika process no kenkyu. Kadaikenkyu kekkahou kokusho. (in Japanese)

Minami, Y. (1999). Gengo shuutokuki ni okeru hatsuwa to uta no kankei. Bulletin of JAME Japanese journal of music education research. 29(1), p.17-32, 1999-06 (in Japanese)

Minegishi, H. (2005). Nihonno ongakukyouikuno henbouto kadai. Geijyutsu art express No. 20. (in Japanese)

Ministry of education, culture, sports, science and technology, Japan, http://www.mext.go.jp/b_menu/shuppan/sonota/990301a.htm, 6/6/2012. (in Japanese)

Ministry of Education, Culture, Sports, Science and Technology. (1998). National curriculum for Junior high schools. http://www.mext.go.jp/a_menu/shotou/cs/1320061.htm, 14/12/2012. (in Japanese)

Ministry of Education, Culture, Sports, Science and Technology. (1998). Youchien Kyouiku Yoryo. Ohkurasho Insatsukyoku: Tokyo. (in Japanese)

Ministry of Education, Culture, Sports, Science and Technology. (2008). Youchien Kyouiku Yoryo Kaisetsu. Froebelsha: Tokyo. (in Japanese)

Ministry of Health, Labour and Welfare. (2008). Hoikusyo Hoikushishin, Kouseiroudoushou kokuji No.141. Froebelsha: Tokyo. (in Japanese)

Ministry of Health, Labour and Welfare. (2008). Hoikusyo Hoikushishin, Kouseiroudoushou Kaisetsusho. Froebelsha: Tokyo. (in Japanese)

Ministry of education, culture, sports, science and technology, Japan. (2008). Shougakkou gakushu shidou youryou kaisetsu, sousokuhen. Toyoshuppansha: Tokyo. (in Japanese)

Ministry of Education, Culture, Sports, Science and Technology. (1998). National curriculum for elementary schools. http://www.mext.go.jp/a_menu/shotou/cs/1319941.htm, 14/12/2012. (in Japanese)

Miura, A. (2005). Karyushakai aratana kaisou syuudannno shutsugen. Koubunsha: Tokyo. (in Japanese)

Moog. H. (1976/09). The musical experience of the pre-school child. Schott Music: London.

Mori, Y. (2004) Classic to Nihonjin. Seikyusha:Tokyo. (in Japanese)

Nagatake, Y. (1993). Opera to kabuki. Maruzen: Tokyo. (in Japanese)

Nakamura, H. (1995). Pianist toiu Banzokugairu. Bunshubunko. Bunshun Bunko: Tokyo. (in Japanese)

Nakamura, H. (1997). Argentine made moguritai. Bunshubunko. Bunshun Bunko: Tokyo. (in Japanese)

Nakayama, I. (2001). A comparison of vocal expression in Japanese traditional and western classical-style singing, using a common verse. Spoken Language Working Group (Ed.). Speech and Grammar III. p.211-218. (in Japanese)

Nazzi, T. & Jusczyk. P. W. (1999). Five-Month-Old Infants' Discrimination of Languages. Proceedings of The annual Boston University Conference on Language.

Murao, T. & Azechi, N. (1998). Upbeat in Japanese popular songs. Information Processing Society of Japan. Ongaku joho kagaku, vol. 51, p.21-26. (in Japanese)

Nikaido, K. (2000). Kodomono Kotoba Rironhen. Sankohshobo: Tokyo. (in Japanese)

Nishie, K. (2006). Showa 40 nendai furugiyaten tenshugamita hokurikuno ongaku scene, BG MAGAZINE vol.10 . Aera News Hokushinetsu. http://www.musicfield.jp/area_news/vol10/index01.html. 3/15/2009. (in Japanese)

Ogura, T. (2005). Chapter 2 Gengohattatsuno gaiyou. Yokuwakaru Genngohattatsu. Iwatate & Ogura. Minelva shoten: Tokyo. (in Japanese)

Ohgushi, K. (2002). "Comparison of dotted rhythm expression between Japanese and Western pianists", Proceedings of the Seventh International Conference of Music Perception and cognition, Sydney, Australia, 2002.

Ohgushi, K. (2006). An analysis of timing microstructure in Mozart's piano sonata K. 331. The Journal of the Acoustical Society of America. 120, 3204.

Okumura, A. & Sasaki, H. (2008). Ongakude Nouwa Kokomade Saiseisuru: Nouno kasoseito ninchiongakuryouhou. Ningento Rekishisha: Tokyo. (in Japanese)

Omi, A. (2001). Youjikyouiku ni okeru warabeuta no kyouikuteki igi. The journal of Kawamura Gakuen Woman's University 12(2), p.69-89. (in Japanese)

Ongakunotomosha (ed.) (2005), Ongaku Nenkan 2005. Ongakunotomosha: Tokyo.

Onishi, T. (1997). Reconsideration of F. KOIZUMI'S Ideas on General Music Education. Aichi Kyouiku Daigaku Kenkyu Houkoku, 46 (kyouikugakkahen), p. 149-154. (in Japanese)

Ono, k. (2007). Kodomonoutawo manabuhitonotameni. Sekaishisousha: Tokyo. (in Japanese)

Papousek, H. (1996). "Musicality in infancy research: biological and cultural origins of early musicality", Musical Beginnings: origins and development of musical competence. Deliege, I. and Sloboda, J. (Eds.) Oxford University Press: Oxford.

Papousek, M. & Papousek, H. (1981). Musical elements in the infant's vocalizations: Their significance for communicationm cognition and creativity. In Lipsitt, L. P. (Ed.), Advances in infancy research vol. 1, p. 163-224. Norwood, NJ: Ablex.

Papousek, M. (1996). "Intuitive parenting: a hidden source of musical stimulation in fancy", Musical Beginnings: origins and development of musical competence. Deliege I. and Sloboda. J. Oxford University Press: Oxford.

Papousek, M. (1996). Intuitive parenting: a hidden source of musical stimulation in infancy. In Deliege I. and Sloboda. J (eds.), Musical Beginnings: origins and development of musical competence. Oxford University Press: Oxford.

Parncutt, R. (2006). Prenatal development. McPherson, G. E. (Ed). The child as musician: A handbook of musical development, (pp. 1-31). New York, NY, US: Oxford University Press, xxi, 501 pp.

Patel, A. D. (2000). Proceedings of the Seventh International Conference of Music Perception and cognition, Sydney, Australia, 2002. Proceedings of the ICMPC7 in Sydney.

Patel, A.D. & Daniele, J.R. (2003). An empirical comparison of rhythm in language and music. Cognition, Volume 87, Issue 1, February 2003, Pages B35-B45.

Patel, A. D. and J. R. Daniele. "Stress-Timed vs. Syllable-Timed Music? A comment on Huron and Ollen. (2003). ",Music Perception 21 (winter 2003 no.2). 2003.

Pinker, S. (1994). The Language Instinct: How the Mind Creates Language. New York: Harper Collins.

Recording industry association of Japan. Trends in production value by type music software. http://www.riaj.or.jp/data/money/index.html. 2012/11/12. (in Japanese)

Robertson, R. (1992). *Globalization: Social theory and global culture* (Vol. 16). Sage.

Sadakata, M., Ohgushi, K., & Desain, P. (2004). A cross-cultural comparison study of the production of simplerhythmic patterns. Psychology of Music, 32 (4) 389-403.

Saito, H. (1999). Saito Hideo Kougi-roku. Hokuseisha: Tokyo. (in Japanese)

Sadakata, M., P. Desain, et. al. (2003). An analysis of rhythm in Japanese and English popular music.

Sadakata, M. (2006). Ritme and rizumu: studies in music cognition. PhD Thesis

Saitoh, M. (2000). Operaha ikaga? 3, Ongakuno dendohshi Masahiro no ensoukano hitorigoto: hissatsu classic navigation, vol.3, http://homepage3.nifty.com/masahiroclub/goroku6.htm. 3/15/2009. (in Japanese)

Saitoh, T. (2001). Koenidashite yomitai nihongo. Soushisha: Tokyo. (in Japanese)

Sakai, Y. (2010). Asobiuta no shidou wo meguru shomondai. Ongakukyouiku jissen journal, vol.8, no.1, p. 68-74. (in Japanese)

Sankeishinbun “shin Akachangaku” shuzaihan. (2003). Akachan gaku wo shitteimasuka?. Shinchosha: Tokyo. (in Japanese)

Sasaki, T., Suetomi, D., Nakajima, Y., Hoopen, G. (2002). Time-shrinking, its propagation, and Gestalt principles.- Perception and psychophysics 64(6), p. 919-931.

Shelter, D. (1989). The inquiry into prenatal musical experiences: a report of the Eastman Project 1980-1987, Pre- and Peri-Natal Psychology, 3/3, p.171-189.

Shibata, M. (1983/2010). Nihon no oto wo kiku. Seidosha: Tokyo. (in Japanese)

Shimura, Y. (1996). Nyujionsei ni okeru kotoba to ongaku –nyujionseijyou no kansei jyouho. Ongakukyouikugaku vol. 26-1, p. 9-14. (in Japanese)

Slade, P. (1989). Listening and language development: sound and music. Lindon Print limited: Bermingham.

Sloboda, J. A. (1987). The Musical Mind: the cognitive psychology of music. Oxford Univrsity Press: Oxford.

Sternberg, S., Knoll, R. L., & Zukofsky, P. (1982). Timing by skilled musicians. *The psychology of music*, p.181-239.

Sugaya, K. (1975). Shiteki rhythm –Onsuritsu ni kansuru note (Poetic rhythm: a note on Onsuritsu). Yamatoshobo: Tokyo. (in Japanese)

Sugimoto, N. (2008). Yonakuni no warabeuta saisouzou note, chiikikenkyu seriese 35, p. 1-84. (in Japanese)

Sundberg, J. (1989). "Synthesis of singing by rule", Current Directions in Computer Music Research, System Development Foundation, Benchmark Series. M. Mathews and J. Pierce. Cambridge, MA, The MIT Press: p.45-55 och p.401-403.

Sundberg, J. (2004). "Review of "The Temporal Structure of Estonian Runic Music" by Jaan Ross & Ilse Lehiste.", Music Perception fall 22(1): p. 159-162.

Suter-Dyson R. and Gabriel, C. (1981). The Psychology of musical ability. London: Methuen

Suzuki method retrived from http://suzukimethod.or.jp/02/idea.html on the 5th of March 2008

Suzuki, Shinichi. (1969). Youji no sainou kyouiku. Meijitosho: Toyko. (in Japanese)

Suzuki, Shinichi. (1985). Nouryoku no hakken. Shuzuki Shinichi zenshu vol. 1. Soushisha: Tokyo. (in Japanese)

Tafuri, J. & Villa, D. (2002). Musical elements in the vocalizations of infants. B J Music Ed. 2002 19;1, p.73-88.

Tafuri, J. (2008). Infant musicality. Ashgate Publishing Limited: England

Taniguchi T. (2000). Otowa kokorononakade ongakuninaru: Ongaku shinrigakuheno shoutai. Kitaohjishobo: Tokyo. (in Japanese)

The Statistic Breau Japan. (1999). Zenkoku shouhi jittai chousa. (in Japanese)

Touyoukanshuppansha henshubu. (2008). Shogakkou shingakusyuushidouyouryou point souseiri. Touyoukanshuppansha: Tokyo. (in Japanese)

Uchida, I. (2008). Machikadono Kyouikuron. Mishimasha: Tokyo. (in Japanese)

Umemoto, T. & Iwabuki. (1990). Senritsukano Hattatsunituite. Development of Improvised Singing, Human Developmental Research, vol.6, p. 133-146. (in Japanese)

Yang, C. (2006). The Infinite Gift: How Children Learn andUnlearn All the Languages of the World. Scribner: New York.

Yasuda, N. (2010). Shintainouryokuwo takameru “wanoshosa”. Chikumashobou: Tokyo. (in Japanese)

Yoneyama, F. (2003). Koeto Nihonjin. Heibonsha: Tokyo. (in Japanese)

Yoneyama, F. (1998). Koeto Nihonjin. Heibonsha: Tokyo. (in Japanese)

Yoshinaga, S. (2003). Wagakuniniokeru seiyouongakurikaino kanouseito genkai. Memoirs of the Faculty of Education, Kumamoto University, Jinbungakka 52, p1-6. (in Japanese)

Wada, Y. (2008). Warabeuta wo mochiita hoikujissenn no igi to kadai (Meaning and Problems of Nursery Practice using Warabeuta). Seikatskagakukennkyushi, vol. 7 Ningen hukushi bunya, p. 219-232 (in Japanese)

Washizu, N. (1997). Warabeita to Nursery Rhyme (mother goose), Nihongo to engo no hikaku gengo rhythmko. Banseisha: Tokyo. (in Japanese)

Washizu, N. (2007). Youkoso mother goose no sekaie. Nihonshuppannkoyukai: Tokyo. (in Japanese)

Welch, F. G. (2006). The musical development and education of Young Children. in B Spodek & O. Saracho (eds.), Handbook of Research on the Education of Young Children. p.25-267. Mahwah; N.J.: Lawrence Erlbaum Associates Inc.

Welch, G. F. (2005). “Singing as communication”, Musical Communication. Miell, D., MacDonald, R., and Hargreaves, D. J. (Eds.) Oxford University Press: New York.

Figures

Tables

Appendix

nPVI1	nPVI2	name	language	age	sex	phrase No.	nPVI1	nPVI2	name	language	age	sex	phrase No.
37.3	26.73	1	Japanese	3	m	1	29.79	19.39	21	English	3	f	1
51.23	43.58	1	Japanese	3	m	2	19.93	17.14	21	English	3	f	2
42.3	30.47	1	Japanese	3	m	3	36.67	27.54	21	English	3	f	3
58.26	41.98	1	Japanese	3	m	4	27.58	16.08	21	English	3	f	4
40.13	32.66	1	Japanese	3	m	5	23.19	15.45	22	English	3	m	1
41.24	32.26	2	Japanese	3	m	1	30.23	20.36	22	English	3	m	2
35.83	22.52	2	Japanese	3	m	2	36.58	28.58	23	English	3	f	1
25.68	12.47	2	Japanese	3	m	3	37.49	28.49	23	English	3	f	2
26.05	18.37	2	Japanese	3	m	4	22.88	14.14	23	English	3	f	3
36.31	23.12	3	Japanese	3	m	3	22.86	14.05	23	English	3	f	4
32.3	18.43	4	Japanese	3	m	3	30.44	23.56	24	English	4	m	1
19.31	12.61	4	Japanese	3	m	4	28.27	21.76	24	English	4	m	2
24.69	16.26	5	Japanese	3	m	1	38.7	25.41	24	English	4	m	3
29.74	22.5	5	Japanese	3	m	5	28.4	21.92	24	English	4	m	4
32.19	18.99	5	Japanese	3	m	6	38.65	31.83	24	English	4	m	5
41.2	29.4	6	Japanese	3	f	1	20.69	18.97	25	English	4	f	1
27.06	17.39	7	Japanese	4	f	1	34.25	26.88	25	English	4	f	2
24.67	12.99	7	Japanese	4	f	2	19.37	16.19	25	English	4	f	3
19.19	18.56	7	Japanese	4	f	3	27.69	19.14	25	English	4	f	4
19.67	13.38	7	Japanese	4	f	5	28.29	22.47	25	English	4	f	5
31.65	25.38	8	Japanese	4	f	1	25.04	20.86	26	English	4	m	1
28.17	22.43	8	Japanese	4	f	2	24.03	10.03	26	English	4	m	2
19.2	13.59	8	Japanese	4	f	3	34.68	28.9	26	English	4	m	3
29.14	22.95	8	Japanese	4	f	4	20.75	17.29	26	English	4	m	4
34.73	28.13	8	Japanese	4	f	5	33.02	27.51	26	English	4	m	5
43.18	32.58	9	Japanese	4	f	1	22.76	18.97	27	English	4	f	1
27.57	16.39	9	Japanese	4	f	2	32.25	26.88	27	English	4	f	2
26.67	15.42	9	Japanese	4	f	3	19.42	16.29	27	English	4	f	3
29.09	18.71	9	Japanese	4	f	4	22.97	19.14	27	English	4	f	4
24.32	13.51	9	Japanese	4	f	5	26.97	22.48	27	English	4	f	5
20.41	17.01	10	Japanese	4	f	1	27.21	22.67	28	English	4	m	1
27.89	23.25	10	Japanese	4	f	2	24.8	20.66	28	English	4	m	2
25.11	20.93	10	Japanese	4	f	3	20.97	17.48	28	English	4	m	3
27.28	22.74	10	Japanese	4	f	4	32.18	26.82	28	English	4	m	4
21.18	17.65	10	Japanese	4	f	5	13.47	11.22	28	English	4	m	5
25.66	21.38	11	Japanese	4	f	1	29.41	20.51	29	English	5	m	1
21.77	18.14	11	Japanese	4	f	2	36.21	23.24	29	English	5	m	2
13.19	10.99	11	Japanese	4	f	3	31.02	21.05	29	English	5	m	3
18.66	15.55	11	Japanese	4	f	4	27.03	17.65	29	English	5	m	4
29.55	24.62	11	Japanese	4	f	5	26.31	17.44	29	English	5	m	5
20.87	17.39	12	Japanese	4	f	1	34.21	24.76	30	English	5	m	1
15.59	12.98	12	Japanese	4	f	2	26.14	17.05	30	English	5	m	2
22.27	18.55	12	Japanese	4	f	3	43.54	31.23	30	English	5	m	3
42.79	36.29	12	Japanese	4	f	4	28.53	17.35	30	English	5	m	4
16.06	13.38	12	Japanese	4	f	5	26.08	17.35	30	English	5	m	5
25.66	21.38	13	Japanese	4	f	1	24.61	20.51	31	English	5	m	1
21.77	18.13	13	Japanese	4	f	2	27.89	23.24	31	English	5	m	2
13.19	10.99	13	Japanese	4	f	3	25.26	21.05	31	English	5	m	3
18.66	15.55	13	Japanese	4	f	4	21.18	17.65	31	English	5	m	4
29.55	24.62	13	Japanese	4	f	5	20.93	17.44	31	English	5	m	5
37.5	31.25	14	Japanese	4	f	1	34.19	26.57	32	English	5	f	1
18.61	15.51	14	Japanese	4	f	2	34.76	23.66	32	English	5	f	2
21.94	18.28	14	Japanese	4	f	3	37.3	25.72	32	English	5	f	3
23.57	19.64	14	Japanese	4	f	4	39.02	25.92	32	English	5	f	4
18.01	15.01	14	Japanese	4	f	5	64.26	47.46	32	English	5	f	5
26.34	21.95	15	Japanese	5	f	1	24.59	20.49	33	English	5	f	1
22.77	18.97	15	Japanese	5	f	2	21.64	18.03	33	English	5	f	2
17.09	14.24	15	Japanese	5	f	3	34.52	28.76	33	English	5	f	3
34.28	28.57	15	Japanese	5	f	4	33.44	27.86	33	English	5	f	4
16.57	13.81	15	Japanese	5	f	5	24.63	20.53	33	English	5	f	5
19.93	16.6	16	Japanese	5	f	1							
22.08	18.4	16	Japanese	5	f	2							
44.75	37.29	16	Japanese	5	f	3							
39.34	32.79	16	Japanese	5	f	4							
19.58	16.32	16	Japanese	5	f	5							
25.25	24.41	17	Japanese	5	f	1							
35.51	33.75	17	Japanese	5	f	2							
16.59	15.14	17	Japanese	5	f	3							
38.63	37.64	17	Japanese	5	f	4							
32.23	28.03	17	Japanese	5	f	5							
19.36	18.57	18	Japanese	5	m	1							
18.25	18.01	18	Japanese	5	m	2							
20.87	20.09	18	Japanese	5	m	3							
17.19	16.83	18	Japanese	5	m	1							
21.48	19.93	19	Japanese	5	m	1							
22.91	19.68	19	Japanese	5	m	2							
34.83	32.81	19	Japanese	5	m	3							
27.19	17.5	19	Japanese	5	m	4							
13.46	13.39	20	Japanese	5	m	1							
17.06	16.32	20	Japanese	5	m	2							
21.89	21.18	20	Japanese	5	m	3							
29.97	29.67	20	Japanese	5	m	4							
18.36	18.22	20	Japanese	5	m	5							

The table above is the revision of table 5.5 in Chapter 5 (p.133). nPVI1 shows the nPVI values which were used in this thesis. nPVI2 shows the value which were

computated by the nPVI culculater on a website (http://www.nsi.edu/~ani/npvi_calculator.html).